

Basic Molecular Biology		Basic Molecular Biology					
Department	Department	Department of Medical Laboratory Sciences					
Course Title /Code	Course Title /Code	Basic Molecular Biology (MeLS2102)					
Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II					
Module Title (Code)	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)					
Module Coordinator	Module Coordinator	Name					
Course EtCTS	Course EtCTS	5 EtCTS					
Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location					
Instructor's Name	Instructor's Name	_____					
Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____					
EtCTS	EtCTS	5 CP/ 135 Hrs.					
Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment	Assessment
		48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.	1
Course Description	Course Description	The course describes components and structures of the nucleic acids, DNA replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes experimental techniques for gene repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis will be clearly indicate its application in medicine.					

Course Objective		Course Objective		<p>3. General Objectives</p> <p>The student will be able to describe the central dogma of molecular biology, DNA replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> <p>4. Instructional Objectives</p> <p>At the end of the course, students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none">Describe an overview of central dogma of Molecular biologyExplain basic chemical structure of DNA, RNAExplain the mechanisms of DNA replication, transcription and translation and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how some of them can be repairedDescribe the different methods of gene transfer and the importance of plasmid vectors in recombinant DNA technology <p>Skill</p> <ul style="list-style-type: none">Assemble basic materials important in molecular techniquesDemonstrate molecular techniques <p>Attitude</p> <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework to complete assignments
Pre-requisite(s)		Pre-requisite(s)		Principle of genetics
Course Status		Course Status		Core
Mode of Delivery		Mode of Delivery		Block
		Schedule		
Day	Contact Hour	Day	Contact Hour	Topics and Sub Topics
One	6 Hrs.	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction

					1.6. Define terms in molecular biology 1.7. Historical overview of molecular biology 1.8. Overview of cellular structure and function, Biological important molecule 1.9. Cellular genetic components 1.10. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 4.1. Experimental basis of DNA 4.2. DNA structure and function 4.3. DNA Replication and enzymes involved 4.4. Damage and Repair
					5 Hrs. Independent study
					1 Hrs Assignment for reading
	Two		Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.6. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.7. Prokaryotic transcription 3.8. Eukaryotic transcription and transcription factors 3.9. Chromatin structure and eukaryotic transcription 3.10. Post-transcriptional events; RNA splicing; capping polyadenylation
					1 Hrs. Assessment <ul style="list-style-type: none"> • Test one
					4 Hrs. Independent study
					1Hrs Assignment for reading
	Three		Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.6. Translation: Prokaryotic Vs Eukaryotic 4.7. Genetic code

					4.8. Protein Structure related to function 4.9. Regulation of Translation 4.10. Post-translation Modification
			4 Hrs.		Written Assignment one
			2 Hrs.		Independent study
	Four		6 Hrs.		<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.4. Strategies for controlling gene expression 5.5. Regulation of gene expression in Prokaryotes 5.6. Regulation of gene expression in eukaryotes
			6 Hrs.		Independent study
			1 Hrs		Assignment for reading
	Five		6 Hrs.		<u>Lecture</u> Chapter Six: - Mutation 6.6. Types of mutation 6.7. Mutagenic agents 6.8. How mutation affects the genetic code? 6.9. Repair of Mutation 6.10. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.3. Extra chromosomal elements: plasmid, transposons 7.4. Gene Transfer: conjugation, transformation, transduction
			1 Hrs.		Assessment • Test two
			4 Hrs.		Independent study
	Six		1 Hrs		Assignment for reading
			6 Hrs.		<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.15 Recombinant DNA technology/genetic engineering 8.16 Cloning and Cloning vectors

				8.17 Steps in cloning 8.18 Gene cloning tools (Plasmids, restriction enzymes, etc 8.19 Gene Libraries
			4 Hrs.	Assignment two written
			2 Hrs.	Independent study
Seven	6	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.20 Extraction of DNA,RNA from cells, 8.21 Gel electrophoresis 8.22 Southern, Northern, Western Blot 8.23 In Situ Hybridization 8.24 PCR
	1		1 Hrs.	Assessment • Test three
	5		5 Hrs.	Independent study
	1		1 Hrs	Assignment for reading
Eight		Eight	7 Hr.	<u>Lecture</u> Chapter Eight Cont 8.25 DNA Hybridization 8.26 Sequencing 8.27 RFLP and SNP 8.28 Molecular markers
			5 Hrs.	Independent study
			1Hrs	Reading for assignment
Nine		Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
			6 Hrs.	Independent study
Ten		Ten	6 Hrs.	Assessment • Group presentation
			6 Hrs.	Independent study
Eleven		Eleven	6Hrs	Tutorial

			6 Hrs.	Independent study													
Twelve	3	Twelve	3 Hrs.	Assessment Final written examination													
Teaching and Learning Methods		Teaching and Learning Methods															
<ul style="list-style-type: none">LectureTutorialDemonstrationPresentationComputer assisted instruction		<ul style="list-style-type: none">Lecture/ Classroom contactTutorialDemonstrationPresentation and group discussionComputer assisted instruction(animation)															
Assessment		Assessment		Type and Weight (Percentage)		Competence to be achieved											
<ul style="list-style-type: none">Assessment will be based on written assignments, presentation, continuous and final examination		<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)		Assignment. (15%) <ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%) Group presentation (5%)		<ul style="list-style-type: none">Describe the central dogma of biologyExplain basic of DNA, RNAExplain the mechanism of replication, transcription and translation associated in gene expressionExplain cause of mutation in the cell and how it can be repairedDescribe the importance of gene transfer vectors in recombinant technologyAssemble basic cloning important in											
				Three Tests (30%) <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>			Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%
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Test 2	10 %	Day 5															
Test 3	10%	Day 7															
Final exam	50%	Day 13															

			<div>techniques</div> <div><div>• Demonstrate techniques</div></div>
Course Policy	Course Policy	Refer in this curriculum.(page)	
Reference (s)	Reference (s)	<div>Required texts:</div> <div>8. Darnel, Lodish, Baltimore. Molecular Cell Bio</div> <div>Recommended study books</div> <div>9. Robert F. weaver, Philip W. Hedrick. Genetics</div> <div>10. James D. Watson: Recombinant DNA</div> <div>11. Robert F. Weaver. Molecular biology</div> <div>12. Benjamin Lewin: Genes VI and above</div> <div>13. Richard J. Epstein: Human Molecular Biology</div> <div>14. P.K. Gupta: Cell and Molecular Biology</div>	
Approval Section	Approval Section	<div>Name of Module Coordinator/Course team leader: _____</div> <div>Signature _____Date:_____</div> <div>Name of School/Department head_____</div> <div>Signature _____Date:_____</div>	
Basic Molecular Biology	Basic Molecular Biology		

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EtCTS	EtCTS	5 CP/ 135 Hrs.					
Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment	Assessment
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Course Description	Course Description	The course describes components and structures of the nucleic acid replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes expression, repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis will be clearly indicate its application in medicine.					
Course Objective	Course Objective	7. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of diseases.					

				genetic diseases in modern medicine. 8. Instructional Objectives At the end of the course, students will be able to: Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular biologyExplain basic chemical structure of DNA, RNAExplain the mechanisms of DNA replication, transcription enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how some of themDescribe the different methods of gene transfer and the importance of vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular techniquesDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework to complete
Pre-requisite(s)		Pre-requisite(s)		Principle of genetics
Course Status		Course Status		Core
Mode of Delivery		Mode of Delivery		Block
		Schedule		
Day	Co	Day	Contact Hour	Topics and Sub Topics
One		One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.16. Define terms in molecular biology 1.17. Historical overview of molecular biology 1.18. Overview of cellular structure and function, Biological important molecule

				1.19. Cellular genetic components 1.20. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 8.1.Experimental basis of DNA 8.2.DNA structure and function 8.3.DNA Replication and enzymes involved 8.4.Damage and Repair
				5 Hrs. Independent study
				1 Hrs Assignment for reading
	Two		Two	6 Hr. <u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.16. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.17. Prokaryotic transcription 3.18. Eukaryotic transcription and transcription factors 3.19. Chromatin structure and eukaryotic transcription 3.20. Post-transcriptional events; RNA splicing; capping polyadenylation
				1 Hrs. Assessment • Test one
				4 Hrs. Independent study
				1Hrs Assignment for reading
	Three		Three	6Hr. <u>Lecture</u> Chapter Four: Genetic code and its translation 4.16. Translation: Prokaryotic Vs Eukaryotic 4.17. Genetic code 4.18. Protein Structure related to function 4.19. Regulation of Translation 4.20. Post-translation Modification
				4 Hrs. Written Assignment one

			2 Hrs.	Independent study
Four		Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.10. Strategies for controlling gene expression 5.11. Regulation of gene expression in Prokaryotes 5.12. Regulation of gene expression in eukaryotes
			6 Hrs.	Independent study
			1 Hrs	Assignment for reading
Five		Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.16. Types of mutation 6.17. Mutagenic agents 6.18. How mutation affects the genetic code? 6.19. Repair of Mutation 6.20. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.7.Extra chromosomal elements: plasmid, transposons 7.8.Gene Transfer: conjugation, transformation, transduction
			1 Hrs.	Assessment • Test two
			4 Hrs.	Independent study
Six		Six	1Hrs	Assignment for reading
			6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.43 Recombinant DNA technology/genetic engineering 8.44 Cloning and Cloning vectors 8.45 Steps in cloning 8.46 Gene cloning tools (Plasmids, restriction enzymes, etc) 8.47 Gene Libraries
			4 Hrs.	Assignment two written

			2 Hrs.	Independent study
Seven	6	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.48 Extraction of DNA,RNA from cells, 8.49 Gel electrophoresis 8.50 Southern, Northern, Western Blot 8.51 In Situ Hybridization 8.52 PCR
	1		1 Hrs.	Assessment <ul style="list-style-type: none"> • Test three
	5		5 Hrs.	Independent study
	1		1 Hrs	Assignment for reading
Eight		Eight	9 Hr.	<u>Lecture</u> Chapter Eight Cont 8.53 DNA Hybridization 8.54 Sequencing 8.55 RFLP and SNP 8.56 Molecular markers
			5 Hrs.	Independent study
			1Hrs	Reading for assignment
Nine		Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
			6 Hrs.	Independent study
Ten		Ten	6 Hrs.	Assessment <ul style="list-style-type: none"> • Group presentation
			6 Hrs.	Independent study
Eleven		Eleven	6Hrs	Tutorial
			6 Hrs.	Independent study
Twelve	3	Twelve	3 Hrs.	Assessment Final written examination
Teaching and Learning Methods		Teaching and Learning Methods		

<ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)														
Assessment <ul style="list-style-type: none">• Assessment will be based on written assignments, group presentation, continuous tests (30%) and final exam (50%)	Assessment <ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none">• Written Assignment 1. (5%) Discuss The different types of PCR variations.• Written Assignment 2 (10%) Group presentation (5%)	Competence to be achieved <ul style="list-style-type: none">• Describe the central dogma of biology• Explain basic of DNA, RNA• Explain the mechanism of replication, transcription and translation associated in gene expression• Explain cause of mutation in the cell and how it can be repaired• Describe the importance of gene transfer and importance of vectors in recombinant technology• Assemble basic important in molecular biology techniques• Demonstrate molecular biology techniques											
		Three Tests (30%) <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>		Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%
Test 1	10%	Day 2												
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Course Policy	Course Policy	Refer in this curriculum.(page)												

Reference (s)	Reference (s)	Required texts: 22. Darnel, Lodish, Baltimore. Molecular Cell Bio Recommended study books 23. Robert F. weaver, Philip W. Hedrick. Genetics 24. James D. Watson: Recombinant DNA 25. Robert F. Weaver. Molecular biology 26. Benjamin Lewin: Genes VI and above 27. Richard J. Epstein: Human Molecular Biology 28. P.K. Gupta: Cell and Molecular Biology
Approval Section	Approval Section	Name of Module Coordinator/Course team leader: ____ Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____

Basic Molecular Biology	Basic Molecular Biology
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Department	Department	Department of Medical Laboratory Sciences
Course Title /Code	Course Title /Code	Basic Molecular Biology (MeLS2102)
Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II
Module Title (Code)	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)
Module Coordinator	Module Coordinator	Name
Course EtCTS	Course EtCTS	5 EtCTS
Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location
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Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____					
EtCTS	EtCTS	5 CP/ 135 Hrs.					
Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment	Assessment
		48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.	1 Hr.
Course Description	Course Description	The course describes components and structures of the nucleic acids, DNA replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes excision repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis will be clearly indicate its application in medicine.					
Course Objective	Course Objective	<p>11. General Objectives</p> <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> <p>12. Instructional Objectives</p> <p>At the end of the course, students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them are inherited Describe the different methods of gene transfer and the importance of vectors in recombinant DNA technology <p>Skill</p>					

			<ul style="list-style-type: none">Assemble basic materials important in molecular techniquesDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework to complete	
Pre-requisite(s)		Pre-requisite(s)	Principle of genetics	
Course Status		Course Status	Core	
Mode of Delivery		Mode of Delivery	Block	
		Schedule		
Day	Co	Day	Contact Hour	Topics and Sub Topics
One		One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none">1.26. Define terms in molecular biology1.27. Historical overview of molecular biology1.28. Overview of cellular structure and function, Biological important molecule1.29. Cellular genetic components1.30. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material <ul style="list-style-type: none">12.1. Experimental basis of DNA12.2. DNA structure and function12.3. DNA Replication and enzymes involved12.4. Damage and Repair
			5 Hrs.	Independent study
			1 Hrs	Assignment for reading
Two		Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression <ul style="list-style-type: none">3.26. Types of RNA molecules & synthesis (Initiation,

					Elongation & Termination mechanism) 3.27. Prokaryotic transcription 3.28. Eukaryotic transcription and transcription factors 3.29. Chromatin structure and eukaryotic transcription 3.30. Post-transcriptional events; RNA splicing; capping polyadenylation
				1 Hrs.	Assessment • Test one
				4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Three			Three	6Hr. <u>Lecture</u> Chapter Four: Genetic code and its translation 4.26. Translation: Prokaryotic Vs Eukaryotic 4.27. Genetic code 4.28. Protein Structure related to function 4.29. Regulation of Translation 4.30. Post-translation Modification
					4 Hrs. Written Assignment one
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	Four			Four	6 Hrs. <u>Lecture</u> Chapter Five: - Regulation of gene expression 5.16. Strategies for controlling gene expression 5.17. Regulation of gene expression in Prokaryotes 5.18. Regulation of gene expression in eukaryotes
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	Five	6	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.26. Types of mutation 6.27. Mutagenic agents 6.28. How mutation affects the genetic code? 6.29. Repair of Mutation 6.30. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.11. Extra chromosomal elements: plasmid, transposon 7.12. Gene Transfer: conjugation, transformation, transduction
				1 Hrs.	Assessment • Test two
		4		4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Six	6	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.71 Recombinant DNA technology/genetic engineering 8.72 Cloning and Cloning vectors 8.73 Steps in cloning 8.74 Gene cloning tools (Plasmids, restriction enzymes, etc) 8.75 Gene Libraries
		4		4 Hrs.	Assignment two written
		2		2 Hrs.	Independent study
	Seven	6	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.76 Extraction of DNA,RNA from cells, 8.77 Gel electrophoresis 8.78 Southern, Northern, Western Blot 8.79 In Situ Hybridization 8.80 PCR

		1 Hrs.	Assessment <ul style="list-style-type: none">• Test three
		5 Hrs.	Independent study
		1 Hrs	Assignment for reading
Eight		11 Hrs.	<u>Lecture</u> Chapter Eight Cont 8.81 DNA Hybridization 8.82 Sequencing 8.83 RFLP and SNP 8.84 Molecular markers
		5 Hrs.	Independent study
		1Hrs	Reading for assignment
Nine		6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
		6 Hrs.	Independent study
Ten		6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation
		6 Hrs.	Independent study
Eleven		6Hrs	Tutorial
		6 Hrs.	Independent study
Twelve	3 Hrs.	3 Hrs.	Assessment Final written examination
Teaching and Learning Methods <ul style="list-style-type: none">• Lecture• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)		Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	

Assessment <ul style="list-style-type: none"> Assessment will be based on written assignments, group presentation (5%), three continuous tests (30%) and final exam (50%) 	Assessment <ul style="list-style-type: none"> Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none"> Written Assignment 1. (5%) Discuss The different types of PCR variations. Written Assignment 2 (10%) Group presentation (5%)	Competence to be <ul style="list-style-type: none"> Describe the central dogma of biology Explain basic of DNA, RNA Explain the mechanism of replication, transcription and translation associated in gene expression Explain cause of mutation in the cell and how it can be repaired Describe the importance of gene transfer vectors in recombinant technology Assemble basic important in molecular techniques Demonstrate techniques
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			<ul style="list-style-type: none"> Take responsibility for individual work Use your time effectively for group and homework to complete
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			5 Hrs. Independent study
			1 Hrs Assignment for reading
Two		Two	6 Hr. <u>Lecture</u> Chapter Three: RNA and primary Gene Expression <ul style="list-style-type: none"> 3.36. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.37. Prokaryotic transcription 3.38. Eukaryotic transcription and transcription factors 3.39. Chromatin structure and eukaryotic transcription

					3.40. Post-transcriptional events; RNA splicing; capping polyadenylation
				1 Hrs.	Assessment • Test one
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	Three			6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.36. Translation: Prokaryotic Vs Eukaryotic 4.37. Genetic code 4.38. Protein Structure related to function 4.39. Regulation of Translation 4.40. Post-translation Modification
				4 Hrs.	Written Assignment one
				2 Hrs.	Independent study
	Four			6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.22. Strategies for controlling gene expression 5.23. Regulation of gene expression in Prokaryotes 5.24. Regulation of gene expression in eukaryotes
				6 Hrs.	Independent study
				1 Hrs	Assignment for reading

	Five	6	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.36. Types of mutation 6.37. Mutagenic agents 6.38. How mutation affects the genetic code? 6.39. Repair of Mutation 6.40. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.15. Extra chromosomal elements: plasmid, transposon 7.16. Gene Transfer: conjugation, transformation, transduction
				1 Hrs.	Assessment • Test two
				4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Six	6	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.99 Recombinant DNA technology/genetic engineering 8.100 Cloning and Cloning vectors 8.101 Steps in cloning 8.102 Gene cloning tools (Plasmids, restriction enzymes) 8.103 Gene Libraries
				4 Hrs.	Assignment two written
				2 Hrs.	Independent study
	Seven	6	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.104 Extraction of DNA,RNA from cells, 8.105 Gel electrophoresis 8.106 Southern, Northern, Western Blot 8.107 In Situ Hybridization 8.108 PCR

		1 Hrs.	Assessment <ul style="list-style-type: none">• Test three
		5 Hrs.	Independent study
		1 Hrs	Assignment for reading
Eight		13 Hrs.	<u>Lecture</u> Chapter Eight Cont 8.109 DNA Hybridization 8.110 Sequencing 8.111 RFLP and SNP 8.112 Molecular markers
		5 Hrs.	Independent study
		1Hrs	Reading for assignment
Nine		6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
		6 Hrs.	Independent study
Ten		6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation
		6 Hrs.	Independent study
Eleven		6Hrs	Tutorial
		6 Hrs.	Independent study
Twelve	3 Hrs.	3 Hrs.	Assessment Final written examination
Teaching and Learning Methods <ul style="list-style-type: none">• Lecture• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)		Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	

Assessment <ul style="list-style-type: none"> Assessment will be based on written assignments, group presentation, continuous tests and final exam 	Assessment <ul style="list-style-type: none"> Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none"> Written Assignment 1. (5%) Discuss The different types of PCR variations. Written Assignment 2 (10%) Group presentation (5%)	Competence to be achieved <ul style="list-style-type: none"> Describe the central dogma of biology Explain basic of DNA, RNA Explain the mechanism of replication, transcription and translation associated in gene expression Explain cause of mutation in the cell and how it can be repaired Describe the importance of gene transfer and the importance of vectors in recombinant technology Assemble basic cloning techniques important in molecular biology Demonstrate various molecular biology techniques
Course Policy	Course Policy	Refer in this curriculum.(page)	
Reference (s)	Reference (s)	Required texts: 50. Darnell, Lodish, Baltimore. Molecular Cell Biology Recommended study books 51. Robert F. weaver, Philip W. Hedrick. Genetics 52. James D. Watson: Recombinant DNA	

		53. Robert F. Weaver. Molecular biology 54. Benjamin Lewin: Genes VI and above 55. Richard J. Epistein: Human Molecular Biology 56. P.K. Gupta: Cell and Molecular Biology
Approval Section	Approval Section	Name of Module Coordinator/Course team leader: _____ Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____
Basic Molecular Biology	Basic Molecular Biology	
Department	Department	Department of Medical Laboratory Sciences
Course Title /Code	Course Title /Code	Basic Molecular Biology (MeLS2102)
Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II
Module Title (Code)	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)
Module Coordinator	Module Coordinator	Name
Course EtCTS	Course EtCTS	5 EtCTS
Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location
Instructor's Name	Instructor's Name	_____
Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____
EtCTS	EtCTS	5 CP/ 135 Hrs.

Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment	
		48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.	1
Course Description	Course Description	The course describes components and structures of the nucleic acid replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes experimental techniques for gene repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis will be clearly indicate its application in medicine.					
Course Objective	Course Objective	<p>19. General Objectives</p> <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> <p>20. Instructional Objectives</p> <p>At the end of the course, students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them are inherited Describe the different methods of gene transfer and the importance of vectors in recombinant DNA technology <p>Skill</p> <ul style="list-style-type: none"> Assemble basic materials important in molecular techniques Demonstrate molecular techniques <p>Attitude</p> <ul style="list-style-type: none"> Participate actively in discussions and group work Take responsibility for individual work 					

			<ul style="list-style-type: none"> Use your time effectively for group and homework to complete
Pre-requisite(s)		Pre-requisite(s)	Principle of genetics
Course Status		Course Status	Core
Mode of Delivery		Mode of Delivery	Block
		Schedule	
Day	Contact Hour	Day	Contact Hour Topics and Sub Topics
One		One	6 Hrs. <u>Lecture</u> Chapter One: Introduction 1.46. Define terms in molecular biology 1.47. Historical overview of molecular biology 1.48. Overview of cellular structure and function, Biological important molecule 1.49. Cellular genetic components 1.50. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 20.1. Experimental basis of DNA 20.2. DNA structure and function 20.3. DNA Replication and enzymes involved 20.4. Damage and Repair
			5 Hrs. Independent study
			1 Hrs Assignment for reading
Two		Two	6 Hr. <u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.46. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.47. Prokaryotic transcription 3.48. Eukaryotic transcription and transcription factors 3.49. Chromatin structure and eukaryotic transcription 3.50. Post-transcriptional events; RNA splicing; capping

					polyadenylation
				1 Hrs.	Assessment • Test one
				4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Three		Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.46. Translation: Prokaryotic Vs Eukaryotic 4.47. Genetic code 4.48. Protein Structure related to function 4.49. Regulation of Translation 4.50. Post-translation Modification
				4 Hrs.	Written Assignment one
				2 Hrs.	Independent study
	Four		Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.28. Strategies for controlling gene expression 5.29. Regulation of gene expression in Prokaryotes 5.30. Regulation of gene expression in eukaryotes
				6 Hrs.	Independent study
				1 Hrs	Assignment for reading

	Five	6	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.46. Types of mutation 6.47. Mutagenic agents 6.48. How mutation affects the genetic code? 6.49. Repair of Mutation 6.50. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.19. Extra chromosomal elements: plasmid, transposon 7.20. Gene Transfer: conjugation, transformation, transduction
				1 Hrs.	Assessment • Test two
				4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Six	6	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.127 Recombinant DNA technology/genetic engineering 8.128 Cloning and Cloning vectors 8.129 Steps in cloning 8.130 Gene cloning tools (Plasmids, restriction enzymes) 8.131 Gene Libraries
				4 Hrs.	Assignment two written
				2 Hrs.	Independent study
	Seven	6	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.132 Extraction of DNA,RNA from cells, 8.133 Gel electrophoresis 8.134 Southern, Northern, Western Blot 8.135 In Situ Hybridization 8.136 PCR

		1 Hrs.	Assessment <ul style="list-style-type: none">• Test three
		5 Hrs.	Independent study
		1 Hrs	Assignment for reading
Eight		15 Hr.	<u>Lecture</u> Chapter Eight Cont 8.137 DNA Hybridization 8.138 Sequencing 8.139 RFLP and SNP 8.140 Molecular markers
		5 Hrs.	Independent study
		1Hrs	Reading for assignment
Nine		6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
		6 Hrs.	Independent study
Ten		6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation
		6 Hrs.	Independent study
Eleven		6Hrs	Tutorial
		6 Hrs.	Independent study
Twelve	3 Hrs.	3 Hrs.	Assessment Final written examination
Teaching and Learning Methods <ul style="list-style-type: none">• Lecture• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)		Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	

Assessment <ul style="list-style-type: none"> Assessment will be based on written assignments, group presentation, continuous tests and final exam 	Assessment <ul style="list-style-type: none"> Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none"> Written Assignment 1. (5%) Discuss The different types of PCR variations. Written Assignment 2 (10%) Group presentation (5%)	Competence to be achieved <ul style="list-style-type: none"> Describe the central dogma of biology Explain basic of DNA, RNA Explain the mechanism of replication, transcription and translation associated in gene expression Explain cause of mutation in the cell and how it can be repaired Describe the importance of gene transfer and the importance of vectors in recombinant technology Assemble basic cloning techniques important in molecular biology Demonstrate various molecular biology techniques
Course Policy	Course Policy	Refer in this curriculum.(page)	
Reference (s)	Reference (s)	Required texts: 64. Darnel, Lodish, Baltimore. Molecular Cell Bio Recommended study books 65. Robert F. weaver, Philip W. Hedrick. Genetics 66. James D. Watson: Recombinant DNA	

				67. Robert F. Weaver. Molecular biology 68. Benjamin Lewin: Genes VI and above 69. Richard J. Epistein: Human Molecular Biology 70. P.K. Gupta: Cell and Molecular Biology			
Approval Section	Approval Section	Name of Module Coordinator/Course team leader: _____					
		Signature _____ Date: _____					
		Name of School/Department head _____ Signature _____ Date: _____					
Basic Molecular Biology Department Course Title /Coordinator Program/Target Group Module Title (Coordinator) Module Coordinator Course EtCTS Course Information Instructor's Name Instructor's Contact Information EtCTS	Basic Molecular Biology Department Course Title Program Group Module Module Coordinator Course Course Information Instructor Instructor	Basic Molecular Biology Department Course Title Program Group Module Module Coordinator Course Course Information Instructor Instructor	Basic Molecular Biology Department Course Title Program Group Module Module Coordinator Course Course Information Instructor Instructor	Basic Molecular Biology Department Course Title Program/Target Group Module Title Module Coordinator Course EtCTS Course Information Instructor's Instructor's	Basic Molecular Biology Department Course Title Program/Target Group Module Title Module Coordinator Course EtCTS Course Information Instructor's Instructor's	Basic Molecular Biology Department Course Title Program/Target Group Module Title Module Coordinator Course EtCTS Course Information Instructor's Instructor's	Basic Molecular Biology Department Course Title Program/Target Group Module Title Module Coordinator Course EtCTS Course Information Instructor's Instructor's

Student Work Load	Information	Information	Information	Information	Information	Information	Information
Course Description	EtCTS	EtCTS	EtCTS	EtCTS	EtCTS	EtCTS	EtCTS
	Student	Student	Student	Student Work	Student Work	Student Work	Student
	Course I	Course I	Course I	Course Desc	Course Des	Course Des	Course I
Course Objective							
	Course C	Course C	Course C	Course Obj	Course Obj	Course Obj	Course C

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	51							
	11							
Eight		Eight	Eight	Eight	Eight	Eight	Eight	Eight
Nine		Nine	Nine	Nine	Nine	Nine	Nine	Nine
Ten		Ten	Ten	Ten	Ten	Ten	Ten	Ten
Eleven		Eleven	Eleven	Eleven	Eleven	Eleven	Eleven	Eleven
Twelve	31	Twelve	Twelve	Twelve	Twelve	Twelve	Twelve	Twelve
Teaching and Learning		Teaching and Learning	Teaching and Learning	Teaching and Learning	Teaching and Learning	Teaching and Learning	Teaching and Learning	Teaching and Learning
• Lecture		•	•	•	•	•	•	•
• Tutorial		•	•	•	•	•	•	•
• Demonstration		•	•	•	•	•	•	•
• Presentation		•	•	•	•	•	•	•
• Computer		•	•	•	•	•	•	•

Assessment	Assessm	Assessm	Assessm	Assessment	Assessmen	Assessmen	Assessm
<ul style="list-style-type: none"> Assessment will be based on assignments, presentation, continuous and final ex 	<ul style="list-style-type: none"> As wi ass pre co an 	<ul style="list-style-type: none"> Ass wil ass pre cor and 	<ul style="list-style-type: none"> As wil ass pre cor and 	<ul style="list-style-type: none"> Assess will be assign present continu and fin 	<ul style="list-style-type: none"> Asses will b assign preser contin and fi 	<ul style="list-style-type: none"> Asses will b assign preser contin and fi 	<ul style="list-style-type: none"> As wil ass pre co an
Course Policy	Course I	Course P	Course F	Course Polic	Course Poli	Course Poli	Course F
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Approval Section	Approval	Approval	Approval	Approval Se	Approval S	Approval S	Approval	Approval

**Basic
Molecular
Biology**

• **Basic Molecular Biology**

Department	Department	Department of Medical Laboratory Sciences
Course Title /Code	Course Title /Code	Basic Molecular Biology (MeLS2102)
Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II
Module Title (Code)	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)
Module Coordinator	Module Coordinator	Name
Course EtCTS	Course EtCTS	5 EtCTS
Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location
Instructor's Name	Instructor's Name	_____
Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____
EtCTS	EtCTS	5 CP/ 135 Hrs.

Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment	
		48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.	1
Course Description	Course Description	The course describes components and structures of the nucleic acid replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes experimental techniques for gene repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis will be clearly indicate its application in medicine.					
Course Objective	Course Objective	<p>39. General Objectives</p> <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> <p>40. Instructional Objectives</p> <p>At the end of the course, students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them are inherited Describe the different methods of gene transfer and the importance of plasmid vectors in recombinant DNA technology <p>Skill</p> <ul style="list-style-type: none"> Assemble basic materials important in molecular techniques Demonstrate molecular techniques <p>Attitude</p> <ul style="list-style-type: none"> Participate actively in discussions and group work Take responsibility for individual work 					

			<ul style="list-style-type: none"> Use your time effectively for group and homework to complete
Pre-requisite(s)	Pre-requisite(s)	Principle of genetics	
Course Status	Course Status	Core	
Mode of Delivery	Mode of Delivery	Block	
	Schedule		
Day	Contact Hour	Topics and Sub Topics	
One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.96. Define terms in molecular biology 1.97. Historical overview of molecular biology 1.98. Overview of cellular structure and function, Biological important molecule 1.99. Cellular genetic components 1.100. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 40.1. Experimental basis of DNA 40.2. DNA structure and function 40.3. DNA Replication and enzymes involved 40.4. Damage and Repair
			5 Hrs. Independent study
			1 Hrs Assignment for reading
Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.96. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.97. Prokaryotic transcription 3.98. Eukaryotic transcription and transcription factors 3.99. Chromatin structure and eukaryotic transcription 3.100. Post-transcriptional events; RNA splicing; capping

					polyadenylation
				1 Hrs.	Assessment • Test one
				4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Three		Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.96. Translation: Prokaryotic Vs Eukaryotic 4.97. Genetic code 4.98. Protein Structure related to function 4.99. Regulation of Translation 4.100. Post-translation Modification
				4 Hrs.	Written Assignment one
				2 Hrs.	Independent study
	Four		Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.58. Strategies for controlling gene expression 5.59. Regulation of gene expression in Prokaryotes 5.60. Regulation of gene expression in eukaryotes
				6 Hrs.	Independent study
				1 Hrs	Assignment for reading

	Five	6	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.96. Types of mutation 6.97. Mutagenic agents 6.98. How mutation affects the genetic code? 6.99. Repair of Mutation 6.100. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.39. Extra chromosomal elements: plasmid, transposon 7.40. Gene Transfer: conjugation, transformation, transduction
				1 Hrs.	Assessment • Test two
				4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Six	6	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.267 Recombinant DNA technology/genetic engineering 8.268 Cloning and Cloning vectors 8.269 Steps in cloning 8.270 Gene cloning tools (Plasmids, restriction enzymes) 8.271 Gene Libraries
				4 Hrs.	Assignment two written
				2 Hrs.	Independent study
	Seven	6	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.272 Extraction of DNA,RNA from cells, 8.273 Gel electrophoresis 8.274 Southern, Northern, Western Blot 8.275 In Situ Hybridization 8.276 PCR

		1 Hrs.	Assessment <ul style="list-style-type: none">• Test three
		5 Hrs.	Independent study
		1 Hrs.	Assignment for reading
Eight		25 Hrs.	<u>Lecture</u> Chapter Eight Cont 8.277 DNA Hybridization 8.278 Sequencing 8.279 RFLP and SNP 8.280 Molecular markers
		5 Hrs.	Independent study
		1 Hrs.	Reading for assignment
Nine		6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
		6 Hrs.	Independent study
Ten		6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation
		6 Hrs.	Independent study
Eleven		6 Hrs.	Tutorial
		6 Hrs.	Independent study
Twelve	3 Hrs.	3 Hrs.	Assessment Final written examination
Teaching and Learning Methods <ul style="list-style-type: none">• Lecture• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)		Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	

Assessment <ul style="list-style-type: none"> Assessment will be based on written assignments, group presentation, continuous tests and final exam 	Assessment <ul style="list-style-type: none"> Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none"> Written Assignment 1. (5%) Discuss The different types of PCR variations. Written Assignment 2 (10%) Group presentation (5%)	Competence to be achieved <ul style="list-style-type: none"> Describe the central dogma of biology Explain basic concepts of DNA, RNA Explain the mechanisms of replication, transcription and translation associated in gene expression Explain causes of mutations in the cell and how they can be repaired Describe the importance of gene transfer and the importance of vectors in recombinant technology Assemble basic cloning techniques important in molecular biology Demonstrate various molecular biology techniques
Course Policy	Course Policy	Refer in this curriculum.(page)	
Reference (s)	Reference (s)	Required texts: <p>134. Darnel, Lodish, Baltimore. Molecular Cell Biology</p> Recommended study books <p>135. Robert F. weaver, Philip W. Hedrick. Genes</p> <p>136. James D. Watson: Recombinant DNA</p>	

		137. Robert F. Weaver. Molecular biology 138. Benjamin Lewin: Genes VI and above 139. Richard J. Epistein: Human Molecular Bio 140. P.K. Gupta: Cell and Molecular Biology
Approval Section	Approval Section	Name of Module Coordinator/Course team leader: _____ Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____

**Basic
Molecular
Biology**

Basic Molecular Biology

Department	Department	Department of Medical Laboratory Sciences
Course Title /Code	Course Title /Code	Basic Molecular Biology (MeLS2102)
Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II
Module Title (Code)	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)
Module Coordinator	Module Coordinator	Name
Course EtCTS	Course EtCTS	5 EtCTS
Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location
Instructor's Name	Instructor's Name	_____
Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____
EtCTS	EtCTS	5 CP/ 135 Hrs.

Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment	
		48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.	1
Course Description	Course Description	The course describes components and structures of the nucleic acid replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes experimental techniques for gene repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis will be clearly indicate its application in medicine.					
Course Objective	Course Objective	<p>43. General Objectives</p> <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> <p>44. Instructional Objectives</p> <p>At the end of the course, students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them are inherited Describe the different methods of gene transfer and the importance of vectors in recombinant DNA technology <p>Skill</p> <ul style="list-style-type: none"> Assemble basic materials important in molecular techniques Demonstrate molecular techniques <p>Attitude</p> <ul style="list-style-type: none"> Participate actively in discussions and group work Take responsibility for individual work 					

				<ul style="list-style-type: none">• Use your time effectively for group and homework to complete
Pre-requisite(s)		Pre-requisite(s)		Principle of genetics
Course Status		Course Status		Core
Mode of Delivery		Mode of Delivery		Block
		Schedule		
Day	Contact Hour	Day	Contact Hour	Topics and Sub Topics
One		One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.106. Define terms in molecular biology 1.107. Historical overview of molecular biology 1.108. Overview of cellular structure and function, Biologically important molecule 1.109. Cellular genetic components 1.110. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 44.1. Experimental basis of DNA 44.2. DNA structure and function 44.3. DNA Replication and enzymes involved 44.4. Damage and Repair
			5 Hrs.	Independent study
			1 Hrs	Assignment for reading
Two		Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.106. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.107. Prokaryotic transcription 3.108. Eukaryotic transcription and transcription factors 3.109. Chromatin structure and eukaryotic transcription 3.110. Post-transcriptional events; RNA splicing; capping

					polyadenylation
				1 Hrs.	Assessment • Test one
				4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Three		Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.106. Translation: Prokaryotic Vs Eukaryotic 4.107. Genetic code 4.108. Protein Structure related to function 4.109. Regulation of Translation 4.110. Post-translation Modification
				4 Hrs.	Written Assignment one
				2 Hrs.	Independent study
	Four		Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.64. Strategies for controlling gene expression 5.65. Regulation of gene expression in Prokaryotes 5.66. Regulation of gene expression in eukaryotes
				6 Hrs.	Independent study
				1 Hrs	Assignment for reading

	Five	6	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.106. Types of mutation 6.107. Mutagenic agents 6.108. How mutation affects the genetic code? 6.109. Repair of Mutation 6.110. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.43. Extra chromosomal elements: plasmid, transposon 7.44. Gene Transfer: conjugation, transformation, transduction
				1 Hrs.	Assessment • Test two
		4		4 Hrs.	Independent study
				1Hrs	Assignment for reading
	Six	6	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.295 Recombinant DNA technology/genetic engineering 8.296 Cloning and Cloning vectors 8.297 Steps in cloning 8.298 Gene cloning tools (Plasmids, restriction enzymes) 8.299 Gene Libraries
		4		4 Hrs.	Assignment two written
		2		2 Hrs.	Independent study
	Seven	6	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.300 Extraction of DNA,RNA from cells, 8.301 Gel electrophoresis 8.302 Southern, Northern, Western Blot 8.303 In Situ Hybridization 8.304 PCR

		1 Hrs.	Assessment <ul style="list-style-type: none">• Test three
		5 Hrs.	Independent study
		1 Hrs.	Assignment for reading
Eight		27 Hrs.	<u>Lecture</u> Chapter Eight Cont 8.305 DNA Hybridization 8.306 Sequencing 8.307 RFLP and SNP 8.308 Molecular markers
		5 Hrs.	Independent study
		1 Hrs.	Reading for assignment
Nine		6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
		6 Hrs.	Independent study
Ten		6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation
		6 Hrs.	Independent study
Eleven		6 Hrs.	Tutorial
		6 Hrs.	Independent study
Twelve	3 Hrs.	3 Hrs.	Assessment Final written examination
Teaching and Learning Methods <ul style="list-style-type: none">• Lecture• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)		Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	

Assessment <ul style="list-style-type: none"> Assessment will be based on written assignments, group presentation (5%), three continuous tests (30%) and final exam (50%) 	Assessment <ul style="list-style-type: none"> Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none"> Written Assignment 1. (5%) Discuss The different types of PCR variations. Written Assignment 2 (10%) Group presentation (5%)	Competence to be achieved <ul style="list-style-type: none"> Describe the central dogma of biology Explain basic of DNA, RNA Explain the mechanism of replication, transcription and translation associated in gene expression Explain cause of mutation in the cell and how it can be repaired Describe the importance of gene transfer and the importance of vectors in recombinant technology Assemble basic cloning techniques important in molecular biology Demonstrate various molecular biology techniques
Course Policy	Course Policy	Refer in this curriculum.(page)	
Reference (s)	Reference (s)	Required texts: <p>148. Darnel, Lodish, Baltimore. Molecular Cell Biology</p> Recommended study books <p>149. Robert F. weaver, Philip W. Hedrick. Genes</p> <p>150. James D. Watson: Recombinant DNA</p>	

			151. Robert F. Weaver. Molecular biology 152. Benjamin Lewin: Genes VI and above 153. Richard J. Epistein: Human Molecular Bio 154. P.K. Gupta: Cell and Molecular Biology
Approval Section	Approval Section	Name of Module Coordinator/Course team leader: _____ Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____	
Basic Molecular Biology	Basic Molecular Biology		
Department	Department of Medical Laboratory Sciences		
Course Title /Code	Basic Molecular Biology (MeLS2102)		
Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		
Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		
Module Coordinator	Name		
Course EtCTS	5 EtCTS		
Course Information	Academic Year : _____ Meeting Day _____ Meeting Time _____ Meeting Location: _____ <div style="text-align: right;">Class Room _____</div> <div style="text-align: right;">Lab Room _____</div>		
Instructor's Name	_____		
Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____		
EtCTS	5 CP/ 135 Hrs.		

		<ul style="list-style-type: none"> Use your time effectively for group and homework to complete assignments on ti 	
Pre-requisite(s)		Principle of genetics	
Course Status		Core	
Mode of Delivery		Block	
Schedule			
Day	Contact Hour	Topics and Sub Topics	Reference(s)
One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.111. Define terms in molecular biology 1.112. Historical overview of molecular biology 1.113. Overview of cellular structure and function, Biologically important molecule 1.114. Cellular genetic components 1.115. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 46.1. Experimental basis of DNA 46.2. DNA structure and function 46.3. DNA Replication and enzymes involved 46.4. Damage and Repair	Ref No 2
	5 Hrs.	Independent study	
	1 Hrs	Assignment for reading	
Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.111. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.112. Prokaryotic transcription 3.113. Eukaryotic transcription and transcription factors 3.114. Chromatin structure and eukaryotic transcription 3.115. Post-transcriptional events; RNA splicing; capping; &	Ref No 2

			polyadenylation	
		1 Hrs.	Assessment • Test one	
		4 Hrs.	Independent study	
		1Hrs	Assignment for reading	
	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.111. Translation: Prokaryotic Vs Eukaryotic 4.112. Genetic code 4.113. Protein Structure related to function 4.114. Regulation of Translation 4.115. Post-translation Modification	Ref No 2
		4 Hrs.	Written Assignment one	
		2 Hrs.	Independent study	
	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.67. Strategies for controlling gene expression 5.68. Regulation of gene expression in Prokaryotes 5.69. Regulation of gene expression in eukaryotes	Ref No 2
		6 Hrs.	Independent study	
		1 Hrs	Assignment for reading	

Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.111. Types of mutation 6.112. Mutagenic agents 6.113. How mutation affects the genetic code? 6.114. Repair of Mutation 6.115. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.45. Extra chromosomal elements: plasmid, transposons 7.46. Gene Transfer: conjugation, transformation, transduction	Ref No 2
	1 Hrs.	Assessment • Test two	
	4 Hrs.	Independent study	
	1Hrs	Assignment for reading	
Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.309 Recombinant DNA technology/genetic engineering 8.310 Cloning and Cloning vectors 8.311 Steps in cloning 8.312 Gene cloning tools (Plasmids, restriction enzymes, etc) 8.313 Gene Libraries	Ref No 2
	4 Hrs.	Assignment two written	
	2 Hrs.	Independent study	
Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.314 Extraction of DNA,RNA from cells, 8.315 Gel electrophoresis 8.316 Southern, Northern, Western Blot 8.317 In Situ Hybridization 8.318 PCR	Ref No 2

	1 Hrs.	Assessment <ul style="list-style-type: none">• Test three	
	5 Hrs.	Independent study	
	1 Hrs	Assignment for reading	
Eight	28 Hr.	<u>Lecture</u> Chapter Eight Cont 8.319 DNA Hybridization 8.320 Sequencing 8.321 RFLP and SNP 8.322 Molecular markers	Ref No 2
	5 Hrs.	Independent study	
	1Hrs	Reading for assignment	
	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)	
	6 Hrs.	Independent study	
Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation	
	6 Hrs.	Independent study	
Eleven	6Hrs	Tutorial	
	6 Hrs.	Independent study	
Twelve	3 Hrs.	Assessment Final written examination	
Teaching and Learning Methods <ul style="list-style-type: none"> • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation) 			

<p>Assessment</p> <ul style="list-style-type: none"> Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	<p>Type and Weight (Percentage)</p> <p>Assignment. (15%)</p> <ul style="list-style-type: none"> Written Assignment 1. (5%) Discuss The different types of PCR variations. Written Assignment 2 (10%) <p>Group presentation (5%)</p> <hr/> <p>Three Tests (30%)</p> <table border="0"> <tr> <td>Test 1</td> <td>10%</td> <td>Day 2</td> </tr> <tr> <td>Test 2</td> <td>10 %</td> <td>Day 5</td> </tr> <tr> <td>Test 3</td> <td>10%</td> <td>Day 7</td> </tr> <tr> <td>Final exam</td> <td>50%</td> <td>Day 13</td> </tr> </table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<p>Competence to be assessed</p> <ul style="list-style-type: none"> Describe the an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and list enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them can be repaired Describe the different methods of gene transfer and the importance of different vectors in recombinant DNA technology Assemble basic materials important in molecular techniques Demonstrate molecular techniques
Test 1	10%	Day 2												
Test 2	10 %	Day 5												
Test 3	10%	Day 7												
Final exam	50%	Day 13												
<p>Course Policy</p>	<p>Refer in this curriculum.(page)</p>													
<p>Reference (s)</p>	<p>Required texts:</p> <p>155. Darnel, Lodish, Baltimore. Molecular Cell Biology</p> <p>Recommended study books</p> <p>156. Robert F. weaver, Philip W. Hedrick. Genetics.</p> <p>157. James D. Watson: Recombinant DNA</p>													

		158. Robert F. Weaver. Molecular biology 159. Benjamin Lewin: Genes VI and above 160. Richard J. Epistein: Human Molecular Biology 161. P.K. Gupta: Cell and Molecular Biology	
Approval Section		Name of Module Coordinator/Course team leader: _____ Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____	
Bas ic M ol e c u la r B io lo g y	Basic Molec ular Biolo gy	Basic Molecular Biology	Basic Molec ular Biolog y

Dep	Departm	Department	Department of Medical Labor				Departme
Course Title	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)				Course Title
Program/Target Group	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II				Program/Target Group
Module Title	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)				Module Title
Module Coordinator	Module Coordinator	Module Coordinator	Name				Module Coordinator
Course EtCTS	Course EtCTS	Course EtCTS	5 EtCTS				Course EtCTS
Course Information	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting				Course Information
Instructor's Name	Instructor's Name	Instructor's Name	_____				Instructor's Name
Instructor's Contact Information	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Contact Information
EtCTS	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Student Work Load	Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Student Work Load
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Course Description	Course Description	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course Description
Course Objective	Course Objective	Course Objective	53. General Objectives The student will be able to describe the central dogma of gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of diseases.				Course Objective

				genetic diseases in modern medicine.	
				54. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how they are repaired Describe the different methods of gene transfer and vectors in recombinant DNA technology Skill <ul style="list-style-type: none"> Assemble basic materials important in molecular biology Demonstrate molecular techniques Attitude <ul style="list-style-type: none"> Participate actively in discussions and group work Take responsibility for individual work Use your time effectively for group and homework 	
Pre-requisite	Pre-requisite	Pre-requisite(s)		Principle of genetics	Pre-requisite
Course Status	Course Status	Course Status		Core	Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery		Block	Mode of Delivery
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none"> 1.131. Define terms in molecular biology 1.132. Historical overview of molecular biology 1.133. Overview of cellular structure and function Biologically important molecule	One

					1.134. Cellular genetic components 1.135. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 54.1. Experimental basis of DNA 54.2. DNA structure and function 54.3. DNA Replication and enzymes involved 54.4. Damage and Repair	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.131. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.132. Prokaryotic transcription 3.133. Eukaryotic transcription and translation 3.134. Chromatin structure and eukaryotic transcription 3.135. Post-transcriptional events; RNA splicing polyadenylation	Two
				1 Hrs.	Assessment <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
	1	Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.131. Translation: Prokaryotic Vs Eukaryotic 4.132. Genetic code 4.133. Protein Structure related to function 4.134. Regulation of Translation 4.135. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	

			2 Hrs.	Independent study	
	Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.79. Strategies for controlling gene 5.80. Regulation of gene expression 5.81. Regulation of gene expression	Four
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.131. Types of mutation 6.132. Mutagenic agents 6.133. How mutation affects the genetic co 6.134. Repair of Mutation 6.135. Mutant isolation and detection Chapter Seven: Gene Transfer and Transpos Elements 7.53. Extra chromosomal elements: plas 7.54. Gene Transfer: conjugation, transfo	Five
			1 Hrs.	Assessment • Test two	
			4 Hrs.	Independent study	
			1Hrs	Assignment for reading	
	Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.365 Recombinant DNA technology/gen 8.366 Cloning and Cloning vectors 8.367 Steps in cloning 8.368 Gene cloning tools (Plasmids, restr 8.369 Gene Libraries	Six
			4 Hrs.	Assignment two written	

				2 Hrs.	Independent study	
	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.370 Extraction of DNA,RNA from cell 8.371 Gel electrophoresis 8.372 Southern, Northern, Western Blot 8.373 In Situ Hybridization 8.374 PCR	Seven
				1 Hrs.	Assessment <ul style="list-style-type: none"> • Test three 	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
	I	Eight	Eight	32 Hr.	<u>Lecture</u> Chapter Eight Cont 8.375 DNA Hybridization 8.376 Sequencing 8.377 RFLP and SNP 8.378 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none"> • Group presentation 	Ten
				6 Hrs.	Independent study	
	E	Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
	T	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
Tea	Teaching	Teaching and Learning Methods				Teaching :

		<ul style="list-style-type: none"> • • • • • 	<ul style="list-style-type: none"> • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation) 		<ul style="list-style-type: none"> • L • T • D • P • C
Ass	Assessment	Assessment	Type and Weight (Percentage)	Con	Assessment
•	• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none"> • Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	Assignment. (15%) <ul style="list-style-type: none"> • Written Assignment 1. (5%) Discuss The different types of PCR variations. • Written Assignment 2 (10%) Group presentation (5%)	<ul style="list-style-type: none"> • • • • • 	<ul style="list-style-type: none"> • Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)
Cou	Course Policy	Course Policy	Refer in this curriculum.(page)		Course Policy

	Ref	Reference	Reference (s)	Required texts: 183. Darnel, Lodish, Baltimore. J Recommended study books 184. Robert F. weaver, Philip W. 185. James D. Watson: Recombi 186. Robert F. Weaver. Molecu 187. Benjamin Lewin: Genes VI 188. Richard J. Epistein: Human 189. P.K. Gupta: Cell and Molec	Reference
	App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____	Approval S
Bas ic M ol e c u la r B io lo	Basic	Molec	• Basic Molecular Biology		Basic
		ular			Molec
		Biolo		ular	Biolog
		gy		y	
		Departm	Department	Department of Medical Labor	Departme
	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Tit
	Program/	Program/Target	BSc Degree in Medical Laboratory Sciences		Course Tit
	Group	Group	Year: II Semester : II		Program/T
	Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Group
	Module C	Module Coordinator	Name		Module Ti
	Course Et	Course EtCTS	5 EtCTS		Module Co
	Course In	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course EtC
					Course Inf

g y Dep Cou Prog Gro Mod Mod Cou Cou Inst Inst Info EtC Stud Cou Cou							
	Instructor	Instructor's Name	_____				Instructor's
	Instructor Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Information
	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course Des
	Course O	Course Objective	61. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 62. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how they affect the function of the cell 				Course Ob

				<ul style="list-style-type: none">Describe the different methods of gene transfer vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework	
	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite
	Course Status	Course Status	Core		Course Status
	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none">1.151. Define terms in molecular biology1.152. Historical overview of molecular biology1.153. Overview of cellular structure and function Biologically important molecule <ul style="list-style-type: none">1.154. Cellular genetic components1.155. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material <ul style="list-style-type: none">62.1. Experimental basis of DNA62.2. DNA structure and function62.3. DNA Replication and enzymes involved62.4. Damage and Repair	One
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Pre-requisite				
Course Status					
Mode of Delivery					

		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.151. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.152. Prokaryotic transcription 3.153. Eukaryotic transcription and translation 3.154. Chromatin structure and eukaryotic transcription 3.155. Post-transcriptional events; RNA splicing polyadenylation	Two
				1 Hrs.	Assessment <ul style="list-style-type: none"> Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.151. Translation: Prokaryotic Vs Eukaryotic 4.152. Genetic code 4.153. Protein Structure related to function 4.154. Regulation of Translation 4.155. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.91. Strategies for controlling gene expression 5.92. Regulation of gene expression 5.93. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.151. Types of mutation 6.152. Mutagenic agents 6.153. How mutation affects the genetic code 6.154. Repair of Mutation 6.155. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.61. Extra chromosomal elements: plasmids 7.62. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.421 Recombinant DNA technology/genetic engineering 8.422 Cloning and Cloning vectors 8.423 Steps in cloning 8.424 Gene cloning tools (Plasmids, restriction enzymes) 8.425 Gene Libraries	
				4 Hrs.	Assignment two written	Six
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.426 Extraction of DNA,RNA from cells 8.427 Gel electrophoresis 8.428 Southern, Northern, Western Blotting 8.429 In Situ Hybridization 8.430 PCR	

			1 Hrs.	Assessment	Seven
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Eight	Eight	36 Hr.	Lecture Chapter Eight Cont 8.431 DNA Hybridization 8.432 Sequencing 8.433 RFLP and SNP 8.434 Molecular markers	Eight
			5 Hrs.	Independent study	
			1Hrs	Reading for assignment	
	Nine	Nine	6 Hrs.	Laboratory 9.1. Laboratory (Demonstration of Molecular Te	Nine
			6 Hrs.	Independent study	
	Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
			6 Hrs.	Independent study	
	Eleven	Eleven	6Hrs	Tutorial	Eleven
			6 Hrs.	Independent study	
	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
	Teaching and Learning Methods	Teaching and Learning Methods			Ten
		<ul style="list-style-type: none"> Lecture/ Classroom contact Tutorial Demonstration Presentation and group discussion Computer assisted instruction(animation) 			Eleven
					Twelve

<div> <div></div> <div> <div>Basic Molecular Biology</div> </div> </div>					ular Biolog y
	Dep	Departm	Department	Department of Medical Labor	Departme
	Cou	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)	Course Tit
	Prog	Program/	Program/Target	BSc Degree in Medical Laboratory Sciences	Program/T
	Gro	Group	Group	Year: II Semester : II	Group
	Mod	Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)	Module Ti
	Mod	Module C	Module Coordinator	Name	Module Co
	Cou	Course Et	Course EtCTS	5 EtCTS	Course EtC
	Cou	Course In	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me	Course Inf

Inst	Instructor	Instructor's Name	_____				Instructor's
Inst Info	Instructor Informati	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Informatio
EtC	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Stud	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Cou	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme activity in prokaryotes and eukaryotes. The course also covers repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing are clearly indicate its application in medicine.				Course De
Cou	Course O	Course Objective	69. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 70. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none"> • Describe an overview of central dogma of Molecular Biology • Explain basic chemical structure of DNA, RNA and proteins • Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression • Explain causes of mutations in the cell and how they affect gene expression • Describe the different methods of gene transfer and cloning using vectors in recombinant DNA technology 				Course Ob

			Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework		
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite
Course Status	Course Status	Course Status	Core		Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <div>1.171. Define terms in molecular biology</div> <div>1.172. Historical overview of molecular biology</div> <div>1.173. Overview of cellular structure and function Biologically important molecule</div> <div>1.174. Cellular genetic components</div> <div>1.175. The central dogma of molecular biology</div> Chapter Two: DNA as Primary Genetic Material <div>70.1. Experimental basis of DNA</div> <div>70.2. DNA structure and function</div> <div>70.3. DNA Replication and enzymes involved</div> <div>70.4. Damage and Repair</div>	One
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression	Two

					<p>3.171. Types of RNA molecules & synthesis Elongation & Termination mechanism</p> <p>3.172. Prokaryotic transcription</p> <p>3.173. Eukaryotic transcription and translation</p> <p>3.174. Chromatin structure and eukaryotic transcription</p> <p>3.175. Post-transcriptional events; RNA splicing and polyadenylation</p>	
				1 Hrs.	<p>Assessment</p> <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
	7	Three	Three	6Hr.	<p><u>Lecture</u></p> <p>Chapter Four: Genetic code and its translation</p> <p>4.171. Translation: Prokaryotic Vs Eukaryotic</p> <p>4.172. Genetic code</p> <p>4.173. Protein Structure related to function</p> <p>4.174. Regulation of Translation</p> <p>4.175. Post-translation Modification</p>	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<p><u>Lecture</u></p> <p>Chapter Five: - Regulation of gene expression</p> <p>5.103. Strategies for controlling gene expression</p> <p>5.104. Regulation of gene expression</p> <p>5.105. Regulation of gene expression</p>	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.171. Types of mutation 6.172. Mutagenic agents 6.173. How mutation affects the genetic code 6.174. Repair of Mutation 6.175. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.69. Extra chromosomal elements: plasmids 7.70. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.477 Recombinant DNA technology/genetic engineering 8.478 Cloning and Cloning vectors 8.479 Steps in cloning 8.480 Gene cloning tools (Plasmids, restriction enzymes) 8.481 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.482 Extraction of DNA,RNA from cells 8.483 Gel electrophoresis 8.484 Southern, Northern, Western Blotting 8.485 In Situ Hybridization 8.486 PCR	Seven

				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	40 Hr.	<u>Lecture</u> Chapter Eight Cont 8.487 DNA Hybridization 8.488 Sequencing 8.489 RFLP and SNP 8.490 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
	E	Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
	T	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
Tea	Teaching	Teaching and Learning Methods • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation)				Teaching : • L • T • D • P • C

Assessment	Assessment	Assessment	Type and Weight (Percentage)	Con	Assessment												
<ul style="list-style-type: none">•	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<p>Assignment. (15%)</p> <ul style="list-style-type: none">• Written Assignment 1. (5%) Discuss The different types of PCR variations.• Written Assignment 2 (10%) <p>Group presentation (5%)</p> <p>Three Tests (30%)</p> <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<ul style="list-style-type: none">••••••	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)
Test 1	10%	Day 2															
Test 2	10 %	Day 5															
Test 3	10%	Day 7															
Final exam	50%	Day 13															
Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)		Course Policy												
Reference	Reference	Reference (s)	<p>Required texts:</p> <p>239. Darnel, Lodish, Baltimore. I</p> <p>Recommended study books</p> <p>240. Robert F. weaver, Philip W.</p> <p>241. James D. Watson: Recombi</p>		Reference												

				242. Robert F. Weaver. Molecular Biology 243. Benjamin Lewin: Genes VI 244. Richard J. Epstein: Human 245. P.K. Gupta: Cell and Molec	
App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____		Approval S
Basic Molecular Biology	Basic Molecular Biology	• Basic Molecular Biology			Basic Molecular Biology
	Department	Department	Department of Medical Labor		Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Title
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		Program/Target Group
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Module Title
	Module Coordinator	Module Coordinator	Name		Module Coordinator
	Course EtCTS	Course EtCTS	5 EtCTS		Course EtCTS
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course Information
	Instructor's Name	Instructor's Name	_____		Instructor's
	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____		Instructor's

Prog			E-mail _____				Information
Gro			Office Hour _____				
Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				
Mod	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	EtCTS
Cou				ation		Study	Student W
Cou			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing are clearly indicate its application in medicine.				Course De
Inst							
Inst							
Info	Course O	Course Objective	77. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.				Course Ob
EtC							
Stud							
	Cou		78. Instructional Objectives At the end of the course, students will be able to				
Cou			Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and cloning using vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques				

			Attitude <ul style="list-style-type: none">• Participate actively in discussions and group work• Take responsibility for individual work• Use your time effectively for group and homework				
		Pre-requisite(s)	Principle of genetics				
		Course Status	Core				
		Mode of Delivery	Block				
			Schedule				
		Day	Day	Contact Hour		Topics and Sub Topics	
		One	One	6 Hrs.		<u>Lecture</u> Chapter One: Introduction 1.191. Define terms in molecular biology 1.192. Historical overview of molecular biology 1.193. Overview of cellular structure and function Biologically important molecule 1.194. Cellular genetic components 1.195. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 78.1. Experimental basis of DNA 78.2. DNA structure and function 78.3. DNA Replication and enzymes involved 78.4. Damage and Repair	
						5 Hrs.	Independent study
						1 Hrs	Assignment for reading
		Two	Two	6 Hr.		<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.191. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.192. Prokaryotic transcription	

					3.193. Eukaryotic transcription and translation 3.194. Chromatin structure and eukaryotic transcription 3.195. Post-transcriptional events; RNA splicing and polyadenylation	
				1 Hrs.	Assessment • Test one	
				4 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
	Three	Three	6Hr.		<u>Lecture</u> Chapter Four: Genetic code and its translation 4.191. Translation: Prokaryotic Vs Eukaryotic 4.192. Genetic code 4.193. Protein Structure related to function 4.194. Regulation of Translation 4.195. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
	Four	Four	6 Hrs.		<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.115. Strategies for controlling gene expression 5.116. Regulation of gene expression 5.117. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.191. Types of mutation 6.192. Mutagenic agents 6.193. How mutation affects the genetic code 6.194. Repair of Mutation 6.195. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.77. Extra chromosomal elements: plasmids 7.78. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.533 Recombinant DNA technology/genetic engineering 8.534 Cloning and Cloning vectors 8.535 Steps in cloning 8.536 Gene cloning tools (Plasmids, restriction enzymes) 8.537 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.538 Extraction of DNA,RNA from cell 8.539 Gel electrophoresis 8.540 Southern, Northern, Western Blot 8.541 In Situ Hybridization 8.542 PCR	Seven

Syllabus				1 Hrs.	Assessment <ul style="list-style-type: none">Test three	Eight
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
	Eight	Eight	44 Hr.	Lecture	Chapter Eight Cont 8.543 DNA Hybridization 8.544 Sequencing 8.545 RFLP and SNP 8.546 Molecular markers	
				Chapter Eight Cont		
				8.543 DNA Hybridization		
				8.544 Sequencing		
			5 Hrs.	Independent study		
			1Hrs	Reading for assignment		
	Nine	Nine	6 Hrs.	Laboratory	9.1. Laboratory (Demonstration of Molecular Te	
			6 Hrs.	Independent study		
	Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">Group presentation		
			6 Hrs.	Independent study	Nine	
	Eleven	Eleven	6Hrs	Tutorial		
			6 Hrs.	Independent study	Ten	
	Twelve	Twelve	3 Hrs.	Assessment Final written examination		
	Teaching Methods	Teaching and Learning Methods <ul style="list-style-type: none">Lecture/ Classroom contactTutorialDemonstrationPresentation and group discussionComputer assisted instruction(animation)				
					Twelve	
					Teaching :	

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				270. Robert F. Weaver. Molecular Biology	Course Policy	
				271. Benjamin Lewin: Genes VI		Reference
				272. Richard J. Epstein: Human		
				273. P.K. Gupta: Cell and Molec		
		Approval	Approval Section	Name of Module Coordinator/Course tea		Approval S
		Signature _____Date:_____				
		Name of School/Department head_____				
		Signature _____Date:_____				
	Basic Molec ular Biolo gy	Basic Molecular Biology			Basic Molec ular Biolog y	
Cou						
Ref						
App						

<div> <div></div> <div> <div>Basic Molecular Cellular Biology</div> </div> </div>					
	Department	Department	Department	Department of Medical Laboratory Sciences	Department
	Course Title	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)	Course Title
	Program/Target Group	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II	Program/Target Group
	Module Title	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)	Module Title
	Module Coordinator	Module Coordinator	Module Coordinator	Name	Module Coordinator
	Course ECTS	Course ECTS	Course ECTS	5 ECTS	Course ECTS
	Course Information	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting	Course Information

Inst	Instructor	Instructor's Name	_____				Instructor's
Inst Info	Instructor Informati	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Informatio
EtC	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Stud	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Cou	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing are clearly indicate its application in medicine.				Course De
Cou	Course O	Course Objective	85. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 86. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none"> • Describe an overview of central dogma of Molecular Biology • Explain basic chemical structure of DNA, RNA and proteins • Explain the mechanisms of DNA replication and the role of enzymes associated in gene replication and expression • Explain causes of mutations in the cell and how they affect gene function • Describe the different methods of gene transfer and the use of vectors in recombinant DNA technology 				Course Ob

			Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework		
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite
Course Status	Course Status	Course Status	Core		Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none">1.211. Define terms in molecular biology1.212. Historical overview of molecular biology1.213. Overview of cellular structure and functionBiologically important molecule1.214. Cellular genetic components1.215. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material <ul style="list-style-type: none">86.1. Experimental basis of DNA86.2. DNA structure and function86.3. DNA Replication and enzymes involved86.4. Damage and Repair	One
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression	Two

					<p>3.211. Types of RNA molecules & synthesis Elongation & Termination mechanism</p> <p>3.212. Prokaryotic transcription</p> <p>3.213. Eukaryotic transcription and translation</p> <p>3.214. Chromatin structure and eukaryotic transcription</p> <p>3.215. Post-transcriptional events; RNA splicing and polyadenylation</p>	
				1 Hrs.	<p>Assessment</p> <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
7		Three	Three	6Hr.	<p><u>Lecture</u></p> <p>Chapter Four: Genetic code and its translation</p> <p>4.211. Translation: Prokaryotic Vs Eukaryotic</p> <p>4.212. Genetic code</p> <p>4.213. Protein Structure related to function</p> <p>4.214. Regulation of Translation</p> <p>4.215. Post-translation Modification</p>	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<p><u>Lecture</u></p> <p>Chapter Five: - Regulation of gene expression</p> <p>5.127. Strategies for controlling gene expression</p> <p>5.128. Regulation of gene expression</p> <p>5.129. Regulation of gene expression</p>	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.211. Types of mutation 6.212. Mutagenic agents 6.213. How mutation affects the genetic code 6.214. Repair of Mutation 6.215. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.85. Extra chromosomal elements: plasmids 7.86. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.589 Recombinant DNA technology/genetic engineering 8.590 Cloning and Cloning vectors 8.591 Steps in cloning 8.592 Gene cloning tools (Plasmids, restriction enzymes) 8.593 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.594 Extraction of DNA,RNA from cells 8.595 Gel electrophoresis 8.596 Southern, Northern, Western Blot 8.597 In Situ Hybridization 8.598 PCR	Seven

				1 Hrs.	Assessment <ul style="list-style-type: none"> Test three 	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
I	Eight	Eight	48 Hrs.	Lecture <p>Chapter Eight Cont</p> <p>8.599 DNA Hybridization</p> <p>8.600 Sequencing</p> <p>8.601 RFLP and SNP</p> <p>8.602 Molecular markers</p>		Eight
				5 Hrs. Independent study		
				1Hrs Reading for assignment		
	Nine	Nine	6 Hrs.	Laboratory <p>9.1. Laboratory (Demonstration of Molecular Te</p>		Nine
			6 Hrs.	Independent study		
	Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none"> Group presentation 		Ten
			6 Hrs.	Independent study		
E	Eleven	Eleven	6Hrs	Tutorial		Eleven
			6 Hrs.	Independent study		
T	Twelve	Twelve	3 Hrs.	Assessment <p>Final written examination</p>		Twelve
Tea	Teaching	Teaching and Learning Methods <ul style="list-style-type: none"> Lecture/ Classroom contact Tutorial Demonstration Presentation and group discussion Computer assisted instruction(animation) 				Teaching :
	<ul style="list-style-type: none"> L T D P C 					

Assessment	Assessment	Assessment	Type and Weight (Percentage)	Content	Assessment												
<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<p>Assignment. (15%)</p> <ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%) <p>Group presentation (5%)</p> <p>Three Tests (30%)</p> <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)
Test 1	10%	Day 2															
Test 2	10 %	Day 5															
Test 3	10%	Day 7															
Final exam	50%	Day 13															
Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)	Course Policy	Course Policy												
Reference	Reference	Reference (s)	<p>Required texts:</p> <p>295. Darnel, Lodish, Baltimore. Molecular Cell Biology, 6th Edition, Garland Science, 2014.</p> <p>Recommended study books</p> <p>296. Robert F. weaver, Philip W. Anderson: Molecular Biology of the Cell, 6th Edition, Garland Science, 2014.</p> <p>297. James D. Watson: Recombinant DNA Technology, 3rd Edition, Garland Science, 2014.</p>	Reference	Reference												

				298. Robert F. Weaver. Molecular Biology 299. Benjamin Lewin: Genes VI 300. Richard J. Epistein: Human 301. P.K. Gupta: Cell and Molec	
App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____		Approval S
Basic Molecular Biology	Basic Molecular Biology	• Basic Molecular Biology			Basic Molecular Biology
	Department	Department	Department of Medical Labor		Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Title
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		Program/Target Group
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Module Title
	Module Coordinator	Module Coordinator	Name		Module Coordinator
	Course EtCTS	Course EtCTS	5 EtCTS		Course EtCTS
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course Information
	Instructor's Name	Instructor's Name	_____		Instructor's
	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____		Instructor's

Prog			E-mail _____				Information
Gro			Office Hour _____				
Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Mod	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	
Cou				ation		Study	
Cou				48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course Des
Inst							
Inst							
Info	Course O	Course Objective	93. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 94. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and cloning using vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques				Course Ob
EtC							
Stud							
Cou							
Cou							

			Attitude <ul style="list-style-type: none">• Participate actively in discussions and group work• Take responsibility for individual work• Use your time effectively for group and homework			
	Pre-requisite(s)	Pre-requisite(s)	Principle of genetics			
	Course Status	Course Status	Core			
	Mode of Delivery	Mode of Delivery	Block			
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics		
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.231. Define terms in molecular biology 1.232. Historical overview of molecular biology 1.233. Overview of cellular structure and function Biologically important molecule 1.234. Cellular genetic components 1.235. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 94.1. Experimental basis of DNA 94.2. DNA structure and function 94.3. DNA Replication and enzymes involved 94.4. Damage and Repair		
				5 Hrs.		Independent study
				1 Hrs		Assignment for reading
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.231. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.232. Prokaryotic transcription		

					3.233. Eukaryotic transcription and translation 3.234. Chromatin structure and eukaryotic transcription 3.235. Post-transcriptional events; RNA splicing and polyadenylation	
				1 Hrs.	Assessment • Test one	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
	Three	Three	6Hr.		<u>Lecture</u> Chapter Four: Genetic code and its translation 4.231. Translation: Prokaryotic Vs Eukaryotic 4.232. Genetic code 4.233. Protein Structure related to function 4.234. Regulation of Translation 4.235. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
	Four	Four	6 Hrs.		<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.139. Strategies for controlling gene expression 5.140. Regulation of gene expression 5.141. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.231. Types of mutation 6.232. Mutagenic agents 6.233. How mutation affects the genetic code 6.234. Repair of Mutation 6.235. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.93. Extra chromosomal elements: plasmids 7.94. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.645 Recombinant DNA technology/genetic engineering 8.646 Cloning and Cloning vectors 8.647 Steps in cloning 8.648 Gene cloning tools (Plasmids, restriction enzymes) 8.649 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.650 Extraction of DNA,RNA from cell 8.651 Gel electrophoresis 8.652 Southern, Northern, Western Blot 8.653 In Situ Hybridization 8.654 PCR	Seven

				1 Hrs.	Assessment <ul style="list-style-type: none">• Test three		
				5 Hrs.	Independent study		
				1 Hrs	Assignment for reading		
		Eight	Eight	52 Hr.	<u>Lecture</u> Chapter Eight Cont 8.655 DNA Hybridization 8.656 Sequencing 8.657 RFLP and SNP 8.658 Molecular markers		
					5 Hrs.		Independent study
					1Hrs		Reading for assignment
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Eight	
				6 Hrs.	Independent study		
		Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation		Nine
				6 Hrs.	Independent study		
		Eleven	Eleven	6Hrs	Tutorial	Ten	
				6 Hrs.	Independent study		
		Twelve	Twelve	3 Hrs.	Assessment Final written examination		
		Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	Teaching and Learning Methods			Eleven	
						Twelve	
							Teaching and Learning Methods

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<div> <div></div> <div> <div>Basic Molecular Cellular Biology</div> </div> </div>					
	Department	Department	Department	Department of Medical Laboratory Sciences	Department
	Course Title	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)	Course Title
	Program/Target Group	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II	Program/Target Group
	Module Title	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)	Module Title
	Module Coordinator	Module Coordinator	Module Coordinator	Name	Module Coordinator
	Course ECTS	Course ECTS	Course ECTS	5 ECTS	Course ECTS
	Course Information	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting	Course Information

Inst	Instructor	Instructor's Name	_____				Instructor's
Inst Info	Instructor Informati	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Informatio
EtC	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Stud	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Cou	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing are clearly indicate its application in medicine.				Course De
Cou	Course O	Course Objective	103. General Objectives <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> 104. Instructional Objectives <p>At the end of the course, students will be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> • Describe an overview of central dogma of Molecular Biology • Explain basic chemical structure of DNA, RNA and proteins • Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression • Explain causes of mutations in the cell and how they are inherited • Describe the different methods of gene transfer and expression vectors in recombinant DNA technology 				Course Ob

			Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework		
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite
Course Status	Course Status	Course Status	Core		Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <div>1.256. Define terms in molecular biology</div> <div>1.257. Historical overview of molecular biology</div> <div>1.258. Overview of cellular structure and function: Biologically important molecule</div> <div>1.259. Cellular genetic components</div> <div>1.260. The central dogma of molecular biology</div> Chapter Two: DNA as Primary Genetic Material <div>104.1. Experimental basis of DNA</div> <div>104.2. DNA structure and function</div> <div>104.3. DNA Replication and enzymes</div> <div>104.4. Damage and Repair</div>	One
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression	Two

					<p>3.256. Types of RNA molecules & synthesis Elongation & Termination mechanism</p> <p>3.257. Prokaryotic transcription</p> <p>3.258. Eukaryotic transcription and translation</p> <p>3.259. Chromatin structure and eukaryotic transcription</p> <p>3.260. Post-transcriptional events; RNA splicing and polyadenylation</p>	
				1 Hrs.	<p>Assessment</p> <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
	7	Three	Three	6Hr.	<p><u>Lecture</u></p> <p>Chapter Four: Genetic code and its translation</p> <p>4.256. Translation: Prokaryotic Vs Eukaryotic</p> <p>4.257. Genetic code</p> <p>4.258. Protein Structure related to function</p> <p>4.259. Regulation of Translation</p> <p>4.260. Post-translation Modification</p>	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<p><u>Lecture</u></p> <p>Chapter Five: - Regulation of gene expression</p> <p>5.154. Strategies for controlling gene expression</p> <p>5.155. Regulation of gene expression</p> <p>5.156. Regulation of gene expression</p>	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.256. Types of mutation 6.257. Mutagenic agents 6.258. How mutation affects the genetic code 6.259. Repair of Mutation 6.260. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.103. Extra chromosomal elements: plasmids 7.104. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.715 Recombinant DNA technology/genetic engineering 8.716 Cloning and Cloning vectors 8.717 Steps in cloning 8.718 Gene cloning tools (Plasmids, restriction enzymes) 8.719 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.720 Extraction of DNA,RNA from cells 8.721 Gel electrophoresis 8.722 Southern, Northern, Western Blotting 8.723 In Situ Hybridization 8.724 PCR	Seven

				1 Hrs.	Assessment <ul style="list-style-type: none">• Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
I	Eight	Eight	57 Hr.		Lecture Chapter Eight Cont 8.725 DNA Hybridization 8.726 Sequencing 8.727 RFLP and SNP 8.728 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
				6 Hrs.	Laboratory 9.1. Laboratory (Demonstration of Molecular Te	
				6 Hrs.	Independent study	
	Nine	Nine		6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation	Nine
				6 Hrs.	Independent study	
	Ten	Ten		6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation	Ten
				6 Hrs.	Independent study	
E	Eleven	Eleven		6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
T	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve	
Tea	Teaching	Teaching and Learning Methods				Teaching :
	<ul style="list-style-type: none">• L• T• D• P• C	<ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)				<ul style="list-style-type: none">• L• T• D• P• C

Assessment	Assessment	Assessment	Type and Weight (Percentage)	Comments	Assessment												
<ul style="list-style-type: none">•	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<p>Assignment. (15%)</p> <ul style="list-style-type: none">• Written Assignment 1. (5%) Discuss The different types of PCR variations.• Written Assignment 2 (10%) <p>Group presentation (5%)</p> <p>Three Tests (30%)</p> <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<ul style="list-style-type: none">••••••	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)
Test 1	10%	Day 2															
Test 2	10 %	Day 5															
Test 3	10%	Day 7															
Final exam	50%	Day 13															
Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)		Course Policy												
Reference	Reference	Reference (s)	<p>Required texts:</p> <p>358. Darnel, Lodish, Baltimore. 1994. Molecular Cell Biology. Garland Science, New York.</p> <p>Recommended study books</p> <p>359. Robert F. weaver, Philip W. Hunter. 1997. Molecular Biology of the Cell. Garland Science, New York.</p> <p>360. James D. Watson: Recombinant DNA Technology. Garland Science, New York.</p>		Reference												

				361. Robert F. Weaver. Molecular Biology 362. Benjamin Lewin: Genes VI 363. Richard J. Epistein: Human 364. P.K. Gupta: Cell and Molec	
App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____		Approval S
Basic Molecular Biology	Basic Molecular Biology	• Basic Molecular Biology			Basic Molecular Biology
	Department	Department	Department of Medical Labor		Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Title
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		Program/Target Group
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Module Title
	Module Coordinator	Module Coordinator	Name		Module Coordinator
	Course EtCTS	Course EtCTS	5 EtCTS		Course EtCTS
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course Information
	Instructor's Name	Instructor's Name	_____		Instructor's
	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____		Instructor's

Prog			E-mail _____				Information
Gro			Office Hour _____				
Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Mod	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	
Cou				ation		Study	
Cou				48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De
Inst							
Inst							
Info	Course O	Course Objective	113. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.				Course Ob
EtC							
Stud							
	Cou		114. Instructional Objectives At the end of the course, students will be able to				
	Cou		Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and cloning using vectors in recombinant DNA technology				
	Cou		Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques				

			Attitude <ul style="list-style-type: none">• Participate actively in discussions and group work• Take responsibility for individual work• Use your time effectively for group and homework		
	Pre-requisite	Pre-requisite(s)	Principle of genetics		
	Course Status	Course Status	Core		
	Mode of Delivery	Mode of Delivery	Block		
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.281. Define terms in molecular biology 1.282. Historical overview of molecular biology 1.283. Overview of cellular structure and function Biologically important molecule 1.284. Cellular genetic components 1.285. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 114.1. Experimental basis of DNA 114.2. DNA structure and function 114.3. DNA Replication and enzymes 114.4. Damage and Repair	
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.281. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.282. Prokaryotic transcription	

					3.283. Eukaryotic transcription and translation 3.284. Chromatin structure and eukaryotic transcription 3.285. Post-transcriptional events; RNA splicing and polyadenylation	
				1 Hrs.	Assessment • Test one	
				4 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
	Three	Three	6Hr.		<u>Lecture</u> Chapter Four: Genetic code and its translation 4.281. Translation: Prokaryotic Vs Eukaryotic 4.282. Genetic code 4.283. Protein Structure related to function 4.284. Regulation of Translation 4.285. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
	Four	Four	6 Hrs.		<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.169. Strategies for controlling gene expression 5.170. Regulation of gene expression 5.171. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.281. Types of mutation 6.282. Mutagenic agents 6.283. How mutation affects the genetic code 6.284. Repair of Mutation 6.285. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.113. Extra chromosomal elements: plasmids 7.114. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.785 Recombinant DNA technology/genetic engineering 8.786 Cloning and Cloning vectors 8.787 Steps in cloning 8.788 Gene cloning tools (Plasmids, restriction enzymes) 8.789 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.790 Extraction of DNA,RNA from cell 8.791 Gel electrophoresis 8.792 Southern, Northern, Western Blot 8.793 In Situ Hybridization 8.794 PCR	Seven

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				396. Robert F. Weaver. Molecular Biology 397. Benjamin Lewin: Genes VI 398. Richard J. Epistein: Human 399. P.K. Gupta: Cell and Molec	Course Pol Reference	
		Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____		
		Basic Molec ular Biolo gy	• Basic Molecular Biology			Approval S
Cou	Ref	Departm Course Ti Program/ Group Module T Module C Course Et Course In	Department Course Title /Code Program/Target Group Module Title (Code) Module Coordinator Course EtCTS Course Information	Department of Medical Labor Basic Molecular Biology (MeLS2102) BSc Degree in Medical Laboratory Sciences Year: II Semester : II Immunology and Molecular Biology (MeLSM2109) Name 5 EtCTS Academic Year : Meeting Day _____ Meeting Time _____ Me	Basic Molec ular Biolog y Departme Course Tit Program/T Group Module Ti Module Co Course EtC	
App	Instructor Instructor Informati	Instructor's Name Instructor's Contact Information	_____ Office No. _____ Phone No. _____			

Basic Molecular Cellular Biology			E-mail _____ Office Hour _____				Course Information
	EtCTS	EtCTS	5 CP/ 135 Hrs.				
	Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course Description	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing are clearly indicate its application in medicine.				
	Course Objectives	Course Objective	117. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 118. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and cloning using vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques				
Department						Course Objectives	
Course							
Program							
Growth							
Model							
Model							
Course							
Course							

Inst			Attitude			
Inst			<ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework			
Info	Pre-requisite	Pre-requisite(s)	Principle of genetics			
EtC	Course Status	Course Status	Core			
Stud	Mode of Delivery	Mode of Delivery	Block			
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics		
Cou	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.291. Define terms in molecular biology 1.292. Historical overview of molecular biology 1.293. Overview of cellular structure and function Biologically important molecule 1.294. Cellular genetic components 1.295. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 118.1. Experimental basis of DNA 118.2. DNA structure and function 118.3. DNA Replication and enzymes 118.4. Damage and Repair		Pre-requisite
				Course Status		
				Mode of Delivery		
				Day		
Cou	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.291. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.292. Prokaryotic transcription		One
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

Pre-Course Module				3.293. Eukaryotic transcription and translation	Two	
				3.294. Chromatin structure and eukaryotic transcription		
				3.295. Post-transcriptional events; RNA splicing and polyadenylation		
			1 Hrs.	Assessment <ul style="list-style-type: none">Test one		
	Three	Three	4 Hrs.	Independent study		Three
			1Hrs	Assignment for reading		
			6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation <ul style="list-style-type: none">4.291. Translation: Prokaryotic Vs Eukaryotic4.292. Genetic code4.293. Protein Structure related to function4.294. Regulation of Translation4.295. Post-translation Modification		
			4 Hrs.	Written Assignment one		
			2 Hrs.	Independent study		
			Four	Four		
6 Hrs.	Independent study					
1 Hrs	Assignment for reading					

	7	Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.291. Types of mutation 6.292. Mutagenic agents 6.293. How mutation affects the genetic code 6.294. Repair of Mutation 6.295. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.117. Extra chromosomal elements: plasmids 7.118. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.813 Recombinant DNA technology/genetic engineering 8.814 Cloning and Cloning vectors 8.815 Steps in cloning 8.816 Gene cloning tools (Plasmids, restriction enzymes) 8.817 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.818 Extraction of DNA, RNA from cells 8.819 Gel electrophoresis 8.820 Southern, Northern, Western Blotting 8.821 In Situ Hybridization 8.822 PCR	Seven

S				1 Hrs.	Assessment <ul style="list-style-type: none">• Test three		
				5 Hrs.	Independent study		
				1 Hrs	Assignment for reading		
	Eight	Eight	64 Hr.	<u>Lecture</u> Chapter Eight Cont 8.823 DNA Hybridization 8.824 Sequencing 8.825 RFLP and SNP 8.826 Molecular markers			
				5 Hrs.	Independent study		
				1Hrs	Reading for assignment		
	Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te			
			6 Hrs.	Independent study			
	Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation			
			6 Hrs.	Independent study			
	Eleven	Eleven	6Hrs	Tutorial			
			6 Hrs.	Independent study			
	Twelve	Twelve	3 Hrs.	Assessment Final written examination			
	Teaching <ul style="list-style-type: none">•••••	Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)					

Assessment •			410. Robert F. Weaver. Molecular Biology 411. Benjamin Lewin: Genes VI 412. Richard J. Epstein: Human 413. P.K. Gupta: Cell and Molec	
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date:____ Name of School/Department head____ Signature _____ Date:____	Approval S
Cou Ref				

	App			
Basic Molecular Biology	Basic Molecular Biology	1.2.2 Basic Molecular Biology		Basic Molecular Biology
	Department	Department	Department of Medical Laboratory Sciences	Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)	Course Title
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II	Program/Target Group
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)	Module Title
	Module Coordinator	Module Coordinator	Name	Module Coordinator
	Course ECTS	Course ECTS	5 ECTS	Course ECTS
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Room _____	Course Information
	Instructor's Name	Instructor's Name	_____	Instructor's Name
	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____	Instructor's Contact Information

Gro			E-mail _____				
Mod			Office Hour _____				
Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Cou	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	Student W
Cou				ation		Study	
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De
Inst	Course O	Course Objective	129. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.				Course Ob
Inst Info							
EtC			130. Instructional Objectives At the end of the course, students will be able to				
Stud			Knowledge <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription Explain the mechanisms of gene expression Explain causes of mutations in the cell and how they affect gene function Describe the different methods of gene transfer and cloning 				
Cou			Skill <ul style="list-style-type: none"> Assemble basic materials important in molecular biology Demonstrate molecular techniques 				
Cou							

			Attitude <ul style="list-style-type: none">• Participate actively in discussions and group work• Take responsibility for individual work• Use your time effectively for group and homework			
	Pre-requisite(s)	Pre-requisite(s)	Principle of genetics		Pre-requisite(s)	
	Course Status	Course Status	Core		Course Status	
	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery	
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics	Day	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <div>1.321. Define terms in molecular biology</div> <div>1.322. Historical overview of molecular biology</div> <div>1.323. Overview of cellular structure and function: Biologically important molecule</div> <div>1.324. Cellular genetic components</div> <div>1.325. The central dogma of molecular biology</div> Chapter Two: DNA as Primary Genetic Material <div>130.1. Experimental basis of DNA</div> <div>130.2. DNA structure and function</div> <div>130.3. DNA Replication and enzymes</div> <div>130.4. Damage and Repair</div>	One	
			5 Hrs.	Independent study		
			1 Hrs	Assignment for reading		
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression <div>3.321. Types of RNA molecules & synthesis: Elongation & Termination mechanism</div> <div>3.322. Prokaryotic transcription</div>	Two	

				3.323. Eukaryotic transcription and translation	
				3.324. Chromatin structure and eukaryotic transcription	
				3.325. Post-transcriptional events; RNA splicing and polyadenylation	
				1 Hrs. Assessment • Test one	
	Three	Three	4 Hrs.	Independent study	Three
			1Hrs	Assignment for reading	
			6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.321. Translation: Prokaryotic Vs Eukaryotic 4.322. Genetic code 4.323. Protein Structure related to function 4.324. Regulation of Translation 4.325. Post-translation Modification	
	Four	Four	4 Hrs.	Written Assignment one	Four
			2 Hrs.	Independent study	
			6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.193. Strategies for controlling gene expression 5.194. Regulation of gene expression 5.195. Regulation of gene expression	
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.321. Types of mutation 6.322. Mutagenic agents 6.323. How mutation affects the genetic code 6.324. Repair of Mutation 6.325. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.129. Extra chromosomal elements: plasmids 7.130. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.897 Recombinant DNA technology/genetic engineering 8.898 Cloning and Cloning vectors 8.899 Steps in cloning 8.900 Gene cloning tools (Plasmids, restriction enzymes) 8.901 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.902 Extraction of DNA,RNA from cells 8.903 Gel electrophoresis 8.904 Southern, Northern, Western Blot 8.905 In Situ Hybridization 8.906 PCR	Seven

				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	70 Hr.	<u>Lecture</u> Chapter Eight Cont 8.907 DNA Hybridization 8.908 Sequencing 8.909 RFLP and SNP 8.910 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
		Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
		Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
		Teaching and Learning Methods				
		<ul style="list-style-type: none"> • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation) 				

		Assessment <ul style="list-style-type: none"> Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	Assessment <ul style="list-style-type: none"> Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none"> Written Assignment 1. (5%) Discuss The different types of PCR variations. Written Assignment 2 (10%) Group presentation (5%)	Con <ul style="list-style-type: none"> 	Assessment <ul style="list-style-type: none"> Asses will b assign prese contin and f
	E					
	T					
	Tea					
	Ass	<ul style="list-style-type: none"> 		Three Tests (30%) Test 1 10% Day 2 Test 2 10 % Day 5 Test 3 10% Day 7 Final exam 50% Day 13	<ul style="list-style-type: none"> 	
	Course Po	Course Policy	Refer in this curriculum.(page)	Required texts: 449. Darnel, Lodish, Baltimore. I Recommended study books 450. Robert F. weaver, Philip W. 451. James D. Watson: Recombi		Course Pol
	Reference	Reference (s)				Reference

<div>Cou</div> <div>Ref</div> <div>App</div>				452. Robert F. Weaver. Molecular 453. Benjamin Lewin: Genes VI 454. Richard J. Epstein: Human 455. P.K. Gupta: Cell and Molec	
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____		Approval S
	Basic Molecular Biology	• Basic Molecular Biology			Basic Molecular Biology
	Department	Department	Department of Medical Labor		Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Tit
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		Program/T
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Group
	Module Coordinator	Module Coordinator	Name		Module Ti
	Course EtCTS	Course EtCTS	5 EtCTS		Module Co
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course EtC
Instructor	Instructor's Name	_____		Course Inf	
Instructor Information	Instructor's Contact Information	Office No. _____ Phone No. _____		Instructor's	
					Instructor's

Basic Molecular Biology			E-mail _____ Office Hour _____				Information	
	EtCTS	EtCTS	5 CP/ 135 Hrs.					
	Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study		EtCTS
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.		Student Work Load
	Course Description	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.					Course Description
	Course Objectives	Course Objective	133. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 134. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and cloning using vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques					Course Objectives

Inst			Attitude		
			<ul style="list-style-type: none"> Participate actively in discussions and group work Take responsibility for individual work Use your time effectively for group and homework 		
Inst Info	Pre-requisite(s)	Pre-requisite(s)	Principle of genetics		Pre-requisite(s)
	Course Status	Course Status	Core		
EtC	Mode of Delivery	Mode of Delivery	Block		Course Status
		Schedule			Mode of Delivery
Stud	Day	Day	Contact Hour	Topics and Sub Topics	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.331. Define terms in molecular biology 1.332. Historical overview of molecular biology 1.333. Overview of cellular structure and function Biologically important molecule 1.334. Cellular genetic components 1.335. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 134.1. Experimental basis of DNA 134.2. DNA structure and function 134.3. DNA Replication and enzymes 134.4. Damage and Repair 5 Hrs. Independent study 1 Hrs Assignment for reading	Day
Cou	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.331. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.332. Prokaryotic transcription	One
					Two

Pre-Course Module				3.333. Eukaryotic transcription and translation 3.334. Chromatin structure and eukaryotic transcription 3.335. Post-transcriptional events; RNA splicing and polyadenylation	
			1 Hrs.	Assessment • Test one	
			4 Hrs.	Independent study	
			1 Hrs.	Assignment for reading	
	Three	Three	6 Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.331. Translation: Prokaryotic Vs Eukaryotic 4.332. Genetic code 4.333. Protein Structure related to function 4.334. Regulation of Translation 4.335. Post-translation Modification	Three
			4 Hrs.	Written Assignment one	
			2 Hrs.	Independent study	
	Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.199. Strategies for controlling gene expression 5.200. Regulation of gene expression 5.201. Regulation of gene expression	Four
			6 Hrs.	Independent study	
			1 Hrs.	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.331. Types of mutation 6.332. Mutagenic agents 6.333. How mutation affects the genetic code 6.334. Repair of Mutation 6.335. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.133. Extra chromosomal elements: plasmids 7.134. Gene Transfer: conjugation, transformation	Five
	7			1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.925 Recombinant DNA technology/genetic engineering 8.926 Cloning and Cloning vectors 8.927 Steps in cloning 8.928 Gene cloning tools (Plasmids, restriction enzymes) 8.929 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.930 Extraction of DNA,RNA from cells 8.931 Gel electrophoresis 8.932 Southern, Northern, Western Blot 8.933 In Situ Hybridization 8.934 PCR	Seven

				1 Hrs.	Assessment <ul style="list-style-type: none">• Test three		
				5 Hrs.	Independent study		
				1 Hrs	Assignment for reading		
	Eight	Eight	72 Hr.	Lecture Chapter Eight Cont 8.935 DNA Hybridization 8.936 Sequencing 8.937 RFLP and SNP 8.938 Molecular markers	Eight		
						5 Hrs.	Independent study
						1Hrs	Reading for assignment
	Nine	Nine	6 Hrs.	Laboratory 9.1. Laboratory (Demonstration of Molecular Te	Nine		
						6 Hrs.	Independent study
	Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation	Ten		
						6 Hrs.	Independent study
	Eleven	Eleven	6Hrs	Tutorial	Eleven		
						6 Hrs.	Independent study
	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve		
	Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	Teaching and Learning Methods				Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	

Teaching Methods	Assessment Methods	<ul style="list-style-type: none">Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assessment	Type and Weight (Percentage)			Con	Assessment
				Assignment. (15%)				
				<ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%)				
				Group presentation (5%)				
				Three Tests (30%)				
				Test 1	10%	Day 2		
				Test 2	10 %	Day 5		
				Test 3	10%	Day 7		
				Final exam	50%	Day 13		
				Teaching Methods	Assessment Methods	Assessment		
Course Policy	Course Policy	Refer in this curriculum.(page)			Course Pol			
Reference	Reference (s)	Required texts: 463. Darnel, Lodish, Baltimore. I Recommended study books 464. Robert F. weaver, Philip W. 465. James D. Watson: Recombi			Reference			

Assessment •			466. Robert F. Weaver. Molecular Biology 467. Benjamin Lewin: Genes VI 468. Richard J. Epstein: Human 469. P.K. Gupta: Cell and Molec	
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date:____ Name of School/Department head____ Signature _____ Date:____	Approval S
Cou Ref				

	App				
Basic Molecular Biology	Basic Molecular Biology	1.2.3 Basic Molecular Biology		Basic Molecular Biology	
		Department	Department		Department of Medical Laboratory Sciences
		Course Title	Course Title /Code		Basic Molecular Biology (MeLS2102)
		Program/Target Group	Program/Target Group		BSc Degree in Medical Laboratory Sciences Year: II Semester : II
		Module Title	Module Title (Code)		Immunology and Molecular Biology (MeLSM2109)
		Module Coordinator	Module Coordinator		Name
		Course ECTS	Course ECTS		5 ECTS
		Course Information	Course Information		Academic Year : Meeting Day _____ Meeting Time _____ Meeting
		Instructor's Name	Instructor's Name		_____
		Instructor's Contact Information	Instructor's Contact Information		Office No. _____ Phone No. _____

Gro			E-mail _____				
Mod			Office Hour _____				
Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Cou	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	Student W
Cou				ation		Study	
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing clearly indicate its application in medicine.				Course De
Inst							
Inst Info							
	Course O	Course Objective	145. General Objectives <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> 146. Instructional Objectives <p>At the end of the course, students will be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how they affect gene expression Describe the different methods of gene transfer and cloning using vectors in recombinant DNA technology <p>Skill</p> <ul style="list-style-type: none"> Assemble basic materials important in molecular biology Demonstrate molecular techniques 				Course Ob
EtC							
Stud							
Cou							
Cou							

			Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework			
	Pre-requisite(s)	Pre-requisite(s)	Principle of genetics		Pre-requisite(s)	
	Course Status	Course Status	Core		Course Status	
	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery	
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics	Day	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.361. Define terms in molecular biology 1.362. Historical overview of molecular biology 1.363. Overview of cellular structure and function Biologically important molecule 1.364. Cellular genetic components 1.365. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 146.1. Experimental basis of DNA 146.2. DNA structure and function 146.3. DNA Replication and enzymes 146.4. Damage and Repair	One	
				5 Hrs.		Independent study
				1 Hrs		Assignment for reading
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.361. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.362. Prokaryotic transcription	Two	

				3.363. Eukaryotic transcription and translation	
				3.364. Chromatin structure and eukaryotic transcription	
				3.365. Post-transcriptional events; RNA splicing and polyadenylation	
				1 Hrs. Assessment • Test one	
	Three	Three	4 Hrs.	Independent study	Three
			1Hrs	Assignment for reading	
			6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.361. Translation: Prokaryotic Vs Eukaryotic 4.362. Genetic code 4.363. Protein Structure related to function 4.364. Regulation of Translation 4.365. Post-translation Modification	
			4 Hrs.	Written Assignment one	
			2 Hrs.	Independent study	
	Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.217. Strategies for controlling gene expression 5.218. Regulation of gene expression 5.219. Regulation of gene expression	Four
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.361. Types of mutation 6.362. Mutagenic agents 6.363. How mutation affects the genetic code 6.364. Repair of Mutation 6.365. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.145. Extra chromosomal elements: plasmids 7.146. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1009 Recombinant DNA technology/genetic engineering 8.1010 Cloning and Cloning vectors 8.1011 Steps in cloning 8.1012 Gene cloning tools (Plasmids, restriction enzymes) 8.1013 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1014 Extraction of DNA,RNA from cells 8.1015 Gel electrophoresis 8.1016 Southern, Northern, Western Blot 8.1017 In Situ Hybridization 8.1018 PCR	Seven

				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	78 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1019 DNA Hybridization 8.1020 Sequencing 8.1021 RFLP and SNP 8.1022 Molecular markers	Eight
					5 Hrs. Independent study	
					1Hrs Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
		Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
		Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
		Teaching and Learning Methods				
		<ul style="list-style-type: none"> • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation) 				

		Assessment <ul style="list-style-type: none">Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assessment <ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Type and Weight (Percentage)			Con <ul style="list-style-type: none">	Assessment <ul style="list-style-type: none">Asseswill bassignpresecontinand f												
	E			Assignment. (15%) <ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%)																
	T			Group presentation (5%)																
	Tea			Three Tests (30%) <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>					Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13
	Test 1			10%	Day 2															
	Test 2			10 %	Day 5															
	Test 3			10%	Day 7															
	Final exam			50%	Day 13															
	Ass <ul style="list-style-type: none">																			
	Course Po	Course Policy	Refer in this curriculum.(page)			Course Pol														
	Reference	Reference (s)	Required texts: 505. Darnel, Lodish, Baltimore. I Recommended study books 506. Robert F. weaver, Philip W. 507. James D. Watson: Recombi			Reference														

<div>Cou</div> <div>Ref</div> <div>App</div>				508. Robert F. Weaver. Molecular 509. Benjamin Lewin: Genes VI 510. Richard J. Epstein: Human 511. P.K. Gupta: Cell and Molec	
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____	Approval S	
	Basic Molecular Biology	• Basic Molecular Biology			Basic Molecular Biology
	Department	Department	Department of Medical Labor		Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Tit
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		Program/T
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Group
	Module Coordinator	Module Coordinator	Name		Module Ti
	Course EtCTS	Course EtCTS	5 EtCTS		Module Co
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course EtC
Instructor's Name	Instructor's Name	_____		Course Inf	
Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____		Instructor's	
				Instructor's	

Basic Molecular Cellular Biology			E-mail _____ Office Hour _____				Information		
	EtCTS	EtCTS	5 CP/ 135 Hrs.						
	Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study		EtCTS Student Work Load	
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.			
	Course Description	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.					Course Description	
	Course Objectives	Course Objective	149. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 150. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and cloning using vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques						Course Objectives
	Department								
	Course								
Program									
Group									
Module									
Module									
Course									
Course									

Inst			Attitude		
Inst			<ul style="list-style-type: none">• Participate actively in discussions and group work• Take responsibility for individual work• Use your time effectively for group and homework		
Info	Pre-requisite	Pre-requisite(s)	Principle of genetics		
EtC	Course Status	Course Status	Core		Pre-requisite
Stud	Mode of Instruction	Mode of Delivery	Block		Course Status
		Schedule			Mode of Delivery
	Day	Day	Contact Hour	Topics and Sub Topics	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.371. Define terms in molecular biology 1.372. Historical overview of molecular biology 1.373. Overview of cellular structure and function Biologically important molecule 1.374. Cellular genetic components 1.375. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 150.1. Experimental basis of DNA 150.2. DNA structure and function 150.3. DNA Replication and enzymes 150.4. Damage and Repair	Day
Cou			5 Hrs.	Independent study	One
			1 Hrs	Assignment for reading	
Cou	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.371. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.372. Prokaryotic transcription	Two

Pre-Course Module				3.373. Eukaryotic transcription and translation		
				3.374. Chromatin structure and eukaryotic transcription		
				3.375. Post-transcriptional events; RNA splicing and polyadenylation		
			1 Hrs.	Assessment <ul style="list-style-type: none">Test one		
	Three			4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation		Three
				4.371. Translation: Prokaryotic Vs Eukaryotic		
				4.372. Genetic code		
	4.373. Protein Structure related to function					
4.374. Regulation of Translation						
4.375. Post-translation Modification						
		4 Hrs.	Written Assignment one			
		2 Hrs.	Independent study			
Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression		Four	
			5.223. Strategies for controlling gene expression			
		5.224. Regulation of gene expression				
		6 Hrs.	Independent study			
		1 Hrs	Assignment for reading			

7		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.371. Types of mutation 6.372. Mutagenic agents 6.373. How mutation affects the genetic code 6.374. Repair of Mutation 6.375. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.149. Extra chromosomal elements: plasmids 7.150. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1037 Recombinant DNA technology/genetic engineering 8.1038 Cloning and Cloning vectors 8.1039 Steps in cloning 8.1040 Gene cloning tools (Plasmids, restriction enzymes) 8.1041 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1042 Extraction of DNA,RNA from cells 8.1043 Gel electrophoresis 8.1044 Southern, Northern, Western Blot 8.1045 In Situ Hybridization 8.1046 PCR	Seven

				1 Hrs.	Assessment <ul style="list-style-type: none">• Test three		
				5 Hrs.	Independent study		
				1 Hrs	Assignment for reading		
	Eight	Eight	80 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1047 DNA Hybridization 8.1048 Sequencing 8.1049 RFLP and SNP 8.1050 Molecular markers	Eight		
						5 Hrs.	Independent study
						1Hrs	Reading for assignment
	Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine		
				6 Hrs.		Independent study	
	Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation	Ten		
				6 Hrs.		Independent study	
	Eleven	Eleven	6Hrs	Tutorial	Eleven		
				6 Hrs.		Independent study	
	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve		
	Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)				

Teaching Methods	Assessment Methods	<ul style="list-style-type: none">Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assessment	Type and Weight (Percentage)			Con	Assessment
				Assignment. (15%)				
				<ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%)				
				Group presentation (5%)				
				Three Tests (30%)				
				Test 1	10%	Day 2		
				Test 2	10 %	Day 5		
				Test 3	10%	Day 7		
				Final exam	50%	Day 13		
				Teaching Methods	Assessment Methods	Assessment		
Course Policy	Course Policy	Refer in this curriculum.(page)	Course Pol					
Reference	Reference (s)	Required texts: 519. Darnel, Lodish, Baltimore. I Recommended study books 520. Robert F. weaver, Philip W. 521. James D. Watson: Recombi	Reference					

Assessment •			522. Robert F. Weaver. Molecular Biology 523. Benjamin Lewin: Genes VI 524. Richard J. Epstein: Human 525. P.K. Gupta: Cell and Molec	
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date:____ Name of School/Department head____ Signature _____ Date:____	Approval S
Cou Ref				

	App				
Basic Molecular Biology	Basic Molecular Biology	1.2.4 Basic Molecular Biology		Basic Molecular Biology	
		Department	Department		Department of Medical Laboratory Sciences
		Course Title	Course Title /Code		Basic Molecular Biology (MeLS2102)
		Program/Target Group	Program/Target Group		BSc Degree in Medical Laboratory Sciences Year: II Semester : II
		Module Title	Module Title (Code)		Immunology and Molecular Biology (MeLSM2109)
		Module Coordinator	Module Coordinator		Name
		Course ECTS	Course ECTS		5 ECTS
		Course Information	Course Information		Academic Year : Meeting Day _____ Meeting Time _____ Meeting Room _____
		Instructor's Name	Instructor's Name		_____
		Instructor's Contact Information	Instructor's Contact Information		Office No. _____ Phone No. _____

Gro			E-mail _____				
Mod			Office Hour _____				
Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Cou	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	Student W
Cou				ation		Study	
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De
Inst	Course O	Course Objective	161. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.				Course Ob
Inst Info							
EtC			162. Instructional Objectives At the end of the course, students will be able to				
Stud			Knowledge <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription Explain the mechanisms of gene expression Explain causes of mutations in the cell and how they affect gene expression Describe the different methods of gene transfer and cloning 				
Cou			Skill <ul style="list-style-type: none"> Assemble basic materials important in molecular biology Demonstrate molecular techniques 				
Cou							

			Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework			
	Pre-requisite(s)	Pre-requisite(s)	Principle of genetics		Pre-requisite(s)	
	Course Status	Course Status	Core		Course Status	
	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery	
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics	Day	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <div>1.401. Define terms in molecular biology</div> <div>1.402. Historical overview of molecular biology</div> <div>1.403. Overview of cellular structure and function</div> <div>Biologically important molecule</div> <div>1.404. Cellular genetic components</div> <div>1.405. The central dogma of molecular biology</div> Chapter Two: DNA as Primary Genetic Material <div>162.1. Experimental basis of DNA</div> <div>162.2. DNA structure and function</div> <div>162.3. DNA Replication and enzymes</div> <div>162.4. Damage and Repair</div>	One	
			5 Hrs.	Independent study		
			1 Hrs	Assignment for reading		
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression <div>3.401. Types of RNA molecules & synthesis</div> <div>Elongation & Termination mechanism</div> <div>3.402. Prokaryotic transcription</div>	Two	

				3.403. Eukaryotic transcription and translation	
				3.404. Chromatin structure and eukaryotic transcription	
				3.405. Post-transcriptional events; RNA splicing and polyadenylation	
				1 Hrs. Assessment • Test one	
	Three	Three	4 Hrs.	Independent study	Three
			1Hrs	Assignment for reading	
			6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.401. Translation: Prokaryotic Vs Eukaryotic 4.402. Genetic code 4.403. Protein Structure related to function 4.404. Regulation of Translation 4.405. Post-translation Modification	
	Four	Four	4 Hrs.	Written Assignment one	Four
			2 Hrs.	Independent study	
			6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.241. Strategies for controlling gene expression 5.242. Regulation of gene expression 5.243. Regulation of gene expression	
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.401. Types of mutation 6.402. Mutagenic agents 6.403. How mutation affects the genetic code 6.404. Repair of Mutation 6.405. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.161. Extra chromosomal elements: plasmids 7.162. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1121 Recombinant DNA technology/genetic engineering 8.1122 Cloning and Cloning vectors 8.1123 Steps in cloning 8.1124 Gene cloning tools (Plasmids, restriction enzymes) 8.1125 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1126 Extraction of DNA,RNA from cells 8.1127 Gel electrophoresis 8.1128 Southern, Northern, Western Blot 8.1129 In Situ Hybridization 8.1130 PCR	Seven

				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	86 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1131 DNA Hybridization 8.1132 Sequencing 8.1133 RFLP and SNP 8.1134 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
		Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
		Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
		Teaching and Learning Methods				
		<ul style="list-style-type: none"> • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation) 				

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				564. Robert F. Weaver. Molecular Biology 565. Benjamin Lewin: Genes VI 566. Richard J. Epistein: Human 567. P.K. Gupta: Cell and Molec	
		Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____	Approval S
		Basic Molecular Biology	• Basic Molecular Biology		
	Cou	Departm	Department	Department of Medical Labor	Departme
	Ref	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)	Course Tit
		Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II	Program/T Group
		Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)	Module Ti
		Module C	Module Coordinator	Name	Module Co
		Course Et	Course EtCTS	5 EtCTS	Course EtC
		Course In	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me	Course Inf
App		Instructor	Instructor's Name	_____	
		Instructor Information	Instructor's Contact Information	Office No. _____ Phone No. _____	Instructor's

Basic Molecular Cellular Biology			E-mail _____ Office Hour _____				Instructor's Information
	EtCTS	EtCTS	5 CP/ 135 Hrs.				
	Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	EtCTS
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	Student Work Load
	Course Description	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course Description
	Course Objectives	Course Objective	165. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 166. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and cloning using vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques				Course Objectives

Inst Inst Info EtC Stud Cou Cou			Attitude		Pre-requisi Course Sta Mode of D Day One
			<ul style="list-style-type: none">Participate actively in discussions and group wTake responsibility for individual workUse your time effectively for group and homev		
	Pre-requis	Pre-requisite(s)	Principle of genetics		
	Course St	Course Status	Core		
	Mode of I	Mode of Delivery	Block		
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <div>1.411. Define terms in molecular biolo</div> <div>1.412. Historical overview of molecu</div> <div>1.413. Overview of cellular structure :</div> <div>Biologically important molecule</div> <div>1.414. Cellular genetic components</div> <div>1.415. The central dogma of molecula</div> Chapter Two: DNA as Primary Genetic Mat <div>166.1. Experimental basis of DNA</div> <div>166.2. DNA structure and function</div> <div>166.3. DNA Replication and enzymes</div> <div>166.4. Damage and Repair</div>	
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Exp <div>3.411. Types of RNA molecules & synthe</div> <div>Elongation & Termination mechanisr</div> <div>3.412. Prokaryotic transcription</div>

Pre-Course Module				3.413. Eukaryotic transcription and translation 3.414. Chromatin structure and eukaryotic transcription 3.415. Post-transcriptional events; RNA splicing and polyadenylation					
			1 Hrs.	Assessment <ul style="list-style-type: none">• Test one					
			4 Hrs.	Independent study					
			1Hrs	Assignment for reading					
	Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.411. Translation: Prokaryotic Vs Eukaryotic 4.412. Genetic code 4.413. Protein Structure related to function 4.414. Regulation of Translation 4.415. Post-translation Modification		Three			
			4 Hrs.	Written Assignment one					
			2 Hrs.	Independent study					
			Four	Four			6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.247. Strategies for controlling gene expression 5.248. Regulation of gene expression 5.249. Regulation of gene expression	Four
							6 Hrs.	Independent study	
							1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.411. Types of mutation 6.412. Mutagenic agents 6.413. How mutation affects the genetic code 6.414. Repair of Mutation 6.415. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.165. Extra chromosomal elements: plasmids 7.166. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1149 Recombinant DNA technology/genetic engineering 8.1150 Cloning and Cloning vectors 8.1151 Steps in cloning 8.1152 Gene cloning tools (Plasmids, restriction enzymes) 8.1153 Gene Libraries	
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	Six
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1154 Extraction of DNA,RNA from cells 8.1155 Gel electrophoresis 8.1156 Southern, Northern, Western Blotting 8.1157 In Situ Hybridization 8.1158 PCR	

				1 Hrs.	Assessment • Test three	Seven
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	88 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1159 DNA Hybridization 8.1160 Sequencing 8.1161 RFLP and SNP 8.1162 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Nine
				6 Hrs.	Independent study	
		Eleven	Eleven	6Hrs	Tutorial	
				6 Hrs.	Independent study	Ten
		Twelve	Twelve	3 Hrs.	Assessment Final written examination	
		Teaching and Learning Methods • • • • •	Teaching and Learning Methods • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation)			Eleven
						Twelve

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	Tea			578. Robert F. Weaver. Molecular 579. Benjamin Lewin: Genes VI 580. Richard J. Epstein: Human 581. P.K. Gupta: Cell and Molec	
	Ass	Approval	Approval Section	Name of Module Coordinator/Course tea	
				Signature _____ Date:_____	
				Name of School/Department head _____ Signature _____ Date:_____	
		Basic Molec ular Biolo gy	Basic Molecular Biology		
				Approval S	
					Basic Molec

<p>Cou</p> <p>Ref</p> <p>App</p> <p>Bas ic M ol e c u la r B io</p>			<p>ular Biolog y</p>

lo g y								
	Dep	Departm	Department	Department of Medical Labor				Departme
	Course	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)				Course Tit
	Program	Program/	Program/Target	BSc Degree in Medical Laboratory Sciences				Program/T
	Group	Group	Group	Year: II Semester : II				Group
	Module	Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)				Module Ti
	Module	Module C	Module Coordinator	Name				Module Co
	Course	Course Et	Course EtCTS	5 EtCTS				Course EtC
	Course	Course In	Course Information	Academic Year : Meeting Day Meeting Time Meeting				Course Inf
	Instr	Instructor	Instructor's Name					Instructor's
	Instr	Instructor	Instructor's Contact Information	Office No. Phone No. E-mail Office Hour				Instructor's Information
	EtC	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
	Student	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
				48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De

	Course Objective	173. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes, and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.	Course Objective
		174. Instructional Objectives At the end of the course, students will be able to	
		Knowledge	
		<ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription, and the enzymes associated in gene replication and expression Explain causes of mutations in the cell and how they affect gene expression Describe the different methods of gene transfer and cloning using vectors in recombinant DNA technology 	
		Skill	
		<ul style="list-style-type: none"> Assemble basic materials important in molecular biology Demonstrate molecular techniques 	
		Attitude	
		<ul style="list-style-type: none"> Participate actively in discussions and group work Take responsibility for individual work Use your time effectively for group and homework 	
Pre-requisite(s)	Pre-requisite(s)	Principle of genetics	Pre-requisite(s)
Course Status	Course Status	Core	Course Status
Mode of Delivery	Mode of Delivery	Block	Mode of Delivery
		Schedule	
	Day	Day	Day
		Contact Hour	
	One	One	One
		6 Hrs.	
		<u>Lecture</u>	
		Chapter One: Introduction	

					1.431. Define terms in molecular biology 1.432. Historical overview of molecular biology 1.433. Overview of cellular structure and function Biologically important molecule 1.434. Cellular genetic components 1.435. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 174.1. Experimental basis of DNA 174.2. DNA structure and function 174.3. DNA Replication and enzymes 174.4. Damage and Repair	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.431. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.432. Prokaryotic transcription 3.433. Eukaryotic transcription and translation 3.434. Chromatin structure and eukaryotic transcription 3.435. Post-transcriptional events; RNA splicing polyadenylation	Two
				1 Hrs.	Assessment <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
	Two	Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.431. Translation: Prokaryotic Vs Eukaryotic 4.432. Genetic code	Three

					4.433. Protein Structure related to fu 4.434. Regulation of Translation 4.435. Post-translation Modification	
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.259. Strategies for controlling gene 5.260. Regulation of gene expression 5.261. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.431. Types of mutation 6.432. Mutagenic agents 6.433. How mutation affects the genetic co 6.434. Repair of Mutation 6.435. Mutant isolation and detection Chapter Seven: Gene Transfer and Transpos Elements 7.173. Extra chromosomal elements: plas 7.174. Gene Transfer: conjugation, transfo	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
				6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1205 Recombinant DNA technology/gen 8.1206 Cloning and Cloning vectors	
		Six	Six			Six

				8.1207 Steps in cloning 8.1208 Gene cloning tools (Plasmids, restriction enzymes) 8.1209 Gene Libraries	
			4 Hrs.	Assignment two written	
			2 Hrs.	Independent study	
S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1210 Extraction of DNA,RNA from cell 8.1211 Gel electrophoresis 8.1212 Southern, Northern, Western Blot 8.1213 In Situ Hybridization 8.1214 PCR	Seven
			1 Hrs.	Assessment • Test three	
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
I	Eight	Eight	92 Hr. r.	<u>Lecture</u> Chapter Eight Cont 8.1215 DNA Hybridization 8.1216 Sequencing 8.1217 RFLP and SNP 8.1218 Molecular markers	Eight
			5 Hrs.	Independent study	
			1Hrs	Reading for assignment	
	Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)	Nine
			6 Hrs.	Independent study	
	Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
			6 Hrs.	Independent study	
E	Eleven	Eleven	6Hrs	Tutorial	Eleven

				6 Hrs.	Independent study		
	T	Twelve	Twelve	3 Hrs.	Assessment Final written examination		Twelve
Tea	Teaching	Teaching and Learning Methods					Teaching :
	<ul style="list-style-type: none"> • L • T • D • P • C 	<ul style="list-style-type: none"> • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation) 					<ul style="list-style-type: none"> • L • T • D • P • C
Ass	Assessment	Assessment	Assessment	Type and Weight (Percentage)	Con	Assessment	Assessment
•	• Asses	• Assessment in this course	• Assessment in this course	Assignment. (15%)	•	• Asses	• Asses
	will	will be based on written	will be based on written	• Written Assignment 1.	•	will b	will b
	assign	assignments (15%), group	assignments (15%), group	(5%)	•	assign	assign
	pres	presentation (5%), three	presentation (5%), three	Discuss The different types	•	prese	prese
	cont	continuous tests (30%)	continuous tests (30%)	of PCR variations.	•	contin	contin
	and	and final exam (50%)	and final exam (50%)	• Written Assignment 2	•	and f	and f
				(10%)			
				Group presentation (5%)			
				Three Tests (30%)			
				Test 1 10% Day 2			
				Test 2 10 % Day 5	•		
				Test 3 10% Day 7			
				Final exam 50% Day 13	•		
					•		
					•		
					•		

M ol e c u la r B io lo g y Dep Cou Prog Gro Mod Mod Cou Cou Inst Inst Info	Biolo gy						Biolog y
	Department	Department	Department of Medical Laboratory Sciences				Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)				Course Title
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II				Program/Target Group
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)				Module Title
	Module Coordinator	Module Coordinator	Name				Module Coordinator
	Course ECTS	Course ECTS	5 ECTS				Course ECTS
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Room _____				Course Information
	Instructor's Name	Instructor's Name	_____				Instructor's Name
	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Contact Information
	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
	Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Student Work Load
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course Description	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course Description
	Course Objectives	Course Objective	179. General Objectives				Course Objectives

EtC	Stud			The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes, and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.			
				180. Instructional Objectives			
				At the end of the course, students will be able to			
				Knowledge			
				<ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription, and the enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and the use of plasmid vectors in recombinant DNA technology			
Cou				Skill			
				<ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques			
				Attitude			
				<ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework			
Cou				Pre-requisite(s)			Pre-requisite(s)
				Course Status			Course Status
				Mode of Delivery			Mode of Delivery
				Schedule			
				Day	Day	Contact Hour	Topics and Sub Topics
One				One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.446. Define terms in molecular biology	One

<div>Pre-</div> <div>Cou</div> <div>Mod</div> <div></div> <div></div>				1.447. Historical overview of molecular biology 1.448. Overview of cellular structure and function Biologically important molecule 1.449. Cellular genetic components 1.450. The central dogma of molecular biology	
				Chapter Two: DNA as Primary Genetic Material 180.1. Experimental basis of DNA 180.2. DNA structure and function 180.3. DNA Replication and enzymes 180.4. Damage and Repair	
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.446. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.447. Prokaryotic transcription 3.448. Eukaryotic transcription and translation 3.449. Chromatin structure and eukaryotic transcription 3.450. Post-transcriptional events; RNA splicing and polyadenylation	Two
			1 Hrs.	Assessment <ul style="list-style-type: none"> Test one 	
			4 Hrs.	Independent study	
			1Hrs	Assignment for reading	
	Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.446. Translation: Prokaryotic Vs Eukaryotic 4.447. Genetic code 4.448. Protein Structure related to function	Three

				4.449. Regulation of Translation 4.450. Post-translation Modification	
			4 Hrs.	Written Assignment one	
			2 Hrs.	Independent study	
		Four	Four	6 Hrs. <u>Lecture</u> Chapter Five: - Regulation of gene expression 5.268. Strategies for controlling gene 5.269. Regulation of gene expression 5.270. Regulation of gene expression	Four
				6 Hrs. Independent study	
				1 Hrs Assignment for reading	
		Five	Five	6 Hrs. <u>Lecture</u> Chapter Six: - Mutation 6.446. Types of mutation 6.447. Mutagenic agents 6.448. How mutation affects the genetic co 6.449. Repair of Mutation 6.450. Mutant isolation and detection Chapter Seven: Gene Transfer and Transpos Elements 7.179. Extra chromosomal elements: plas 7.180. Gene Transfer: conjugation, transfo	Five
				1 Hrs. Assessment • Test two	
				4 Hrs. Independent study	
				1Hrs Assignment for reading	
		Six	Six	6 Hrs. <u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1247 Recombinant DNA technology/gen 8.1248 Cloning and Cloning vectors 8.1249 Steps in cloning	Six

				8.1250 Gene cloning tools (Plasmids, restr	
				8.1251 Gene Libraries	
			4 Hrs.	Assignment two written	
			2 Hrs.	Independent study	
		Seven	Seven	<u>Lecture</u> Chapter Eight Cont..... 8.1252 Extraction of DNA,RNA from cell 8.1253 Gel electrophoresis 8.1254 Southern, Northern, Western Blot 8.1255 In Situ Hybridization 8.1256 PCR	
			6 Hrs.		
			1 Hrs.	Assessment <ul style="list-style-type: none"> Test three 	
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
		Eight	Eight	<u>Lecture</u> Chapter Eight Cont 8.1257 DNA Hybridization 8.1258 Sequencing 8.1259 RFLP and SNP 8.1260 Molecular markers	
			95 Hr.		
			5 Hrs.	Independent study	
			1Hrs	Reading for assignment	
		Nine	Nine	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	
			6 Hrs.		
			6 Hrs.	Independent study	
		Ten	Ten	Assessment <ul style="list-style-type: none"> Group presentation 	
			6 Hrs.	Independent study	
		Eleven	Eleven	Tutorial	
			6Hrs		
			6 Hrs.	Independent study	

Ass •				•	
	Course Po	Course Policy	Refer in this curriculum.(page)		Course Pol
	Reference	Reference (s)	Required texts: 624. Darnel, Lodish, Baltimore. I Recommended study books 625. Robert F. weaver, Philip W. 626. James D. Watson: Recombi 627. Robert F. Weaver. Molecu 628. Benjamin Lewin: Genes VI 629. Richard J. Epistein: Human 630. P.K. Gupta: Cell and Molec		Reference
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date:____ Name of School/Department head _____ Signature _____ Date:____		Approval S
	Cou Ref				
	Basic Molec ular	Basic Molecular Biology			Basic Molec ular

		Biology				Biology
	App					
Basic Molecular Biology						
	Department	Department	Department	Department of Medical Laboratory Sciences		Department
	Course Title	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Title
	Program/Target	Program/Target	Program/Target	BSc Degree in Medical Laboratory Sciences		Program/Target

Group	Group	Group	Year: II Semester : II				Group
Module	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)				Module Title
Module	Module Coordinator	Module Coordinator	Name				Module Coordinator
Course	Course EtCTS	Course EtCTS	5 EtCTS				Course EtCTS
Course	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting _____				Course Information
Instructor	Instructor's Name	Instructor's Name	_____				Instructor's Name
Instructor Information	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Contact Information
EtCTS	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Student Work Load	Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Student Work Load
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Course Description	Course Description	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme activity in prokaryotes and eukaryotes. The course also covers repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course Description
Course Objective	Course Objective	Course Objective	189. General Objectives The student will be able to describe the central dogma of gene replication and expressions both in prokaryotes and eukaryotes. perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 190. Instructional Objectives At the end of the course, students will be able to				Course Objective

			Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNAExplain the mechanisms of DNA replication and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they are repairedDescribe the different methods of gene transfer and vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework			
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics			Pre-requisite
Course Status	Course Status	Course Status	Core			Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block			Mode of Delivery
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics		Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.471. Define terms in molecular biology 1.472. Historical overview of molecular biology 1.473. Overview of cellular structure and function: Biologically important molecule 1.474. Cellular genetic components 1.475. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material		One

					190.1. Experimental basis of DNA 190.2. DNA structure and function 190.3. DNA Replication and enzymes 190.4. Damage and Repair	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.471. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.472. Prokaryotic transcription 3.473. Eukaryotic transcription and translation 3.474. Chromatin structure and eukaryotic DNA 3.475. Post-transcriptional events; RNA splicing polyadenylation	Two
				1 Hrs.	Assessment <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.471. Translation: Prokaryotic Vs Eukaryotic 4.472. Genetic code 4.473. Protein Structure related to function 4.474. Regulation of Translation 4.475. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression	Four

					5.283. Strategies for controlling gene 5.284. Regulation of gene expression 5.285. Regulation of gene expression	
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.471. Types of mutation 6.472. Mutagenic agents 6.473. How mutation affects the genetic co 6.474. Repair of Mutation 6.475. Mutant isolation and detection Chapter Seven: Gene Transfer and Transpos Elements 7.189. Extra chromosomal elements: plas 7.190. Gene Transfer: conjugation, transfo	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1317 Recombinant DNA technology/gen 8.1318 Cloning and Cloning vectors 8.1319 Steps in cloning 8.1320 Gene cloning tools (Plasmids, restr 8.1321 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	

	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1322 Extraction of DNA,RNA from cell 8.1323 Gel electrophoresis 8.1324 Southern, Northern, Western Blot 8.1325 In Situ Hybridization 8.1326 PCR	Seven
				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
	I	Eight	Eight	100 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1327 DNA Hybridization 8.1328 Sequencing 8.1329 RFLP and SNP 8.1330 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
E	Eleven	Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
T	Twelve	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
Tea	Teaching	Teaching and Learning Methods				Teaching :

		<ul style="list-style-type: none">•••••	<ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)				<ul style="list-style-type: none">• L• T• D• P• C												
Assessment	Assessment	Assessment	Assessment	Type and Weight (Percentage)	Content	Assessment	Assessment												
<ul style="list-style-type: none">•	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assignment. (15%) <ul style="list-style-type: none">• Written Assignment 1. (5%) Discuss The different types of PCR variations.• Written Assignment 2 (10%) Group presentation (5%)	<ul style="list-style-type: none">•••••	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)												
				Three Tests (30%) <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<ul style="list-style-type: none">•••••		
Test 1	10%	Day 2																	
Test 2	10 %	Day 5																	
Test 3	10%	Day 7																	
Final exam	50%	Day 13																	
Course Policy	Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)		Course Policy	Course Policy												

	Ref	Reference	Reference (s)	Required texts: 659. Darnel, Lodish, Baltimore. J Recommended study books 660. Robert F. weaver, Philip W. 661. James D. Watson: Recombi 662. Robert F. Weaver. Molecu 663. Benjamin Lewin: Genes VI 664. Richard J. Epistein: Human 665. P.K. Gupta: Cell and Molec	Reference
	App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____	Approval S
Bas ic M ol e c u la r B io lo	Basic	Molec ular Biolo gy	• Basic Molecular Biology		Basic
	Departm	Department	Department of Medical Labor		Departme
	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Tit
	Program/	Program/Target	BSc Degree in Medical Laboratory Sciences		Program/T
	Group	Group	Year: II Semester : II		Group
	Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Module Ti
	Module C	Module Coordinator	Name		Module Co
	Course Et	Course EtCTS	5 EtCTS		Course EtC
	Course In	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course Inf

g y Dep Cou Prog Gro Mod Mod Cou Cou Inst Inst Info EtC Stud Cou Cou							
	Instructor	Instructor's Name	_____				Instructor's
	Instructor Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Information
	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme repair and transfer of genes. Basic procedures used in gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De
	Course O	Course Objective	195. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 196. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect the cell				Course Ob

					<ul style="list-style-type: none">Describe the different methods of gene transfer vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework	
	Pre-requisite	Pre-requisite(s)	Principle of genetics			Pre-requisite
	Course Status	Course Status	Core			Course Status
	Mode of Delivery	Mode of Delivery	Block			Mode of Delivery
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics		Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none">1.486. Define terms in molecular biology1.487. Historical overview of molecular biology1.488. Overview of cellular structure and function Biologically important molecule1.489. Cellular genetic components1.490. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material <ul style="list-style-type: none">196.1. Experimental basis of DNA196.2. DNA structure and function196.3. DNA Replication and enzymes196.4. Damage and Repair		One
			5 Hrs.	Independent study		
			1 Hrs	Assignment for reading		
	Pre-requisite					
	Course Status					
Mode of Delivery						

		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.486. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.487. Prokaryotic transcription 3.488. Eukaryotic transcription and translation 3.489. Chromatin structure and eukaryotic transcription 3.490. Post-transcriptional events; RNA splicing polyadenylation	Two
				1 Hrs.	Assessment <ul style="list-style-type: none"> Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.486. Translation: Prokaryotic Vs Eukaryotic 4.487. Genetic code 4.488. Protein Structure related to function 4.489. Regulation of Translation 4.490. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.292. Strategies for controlling gene expression 5.293. Regulation of gene expression 5.294. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.486. Types of mutation 6.487. Mutagenic agents 6.488. How mutation affects the genetic code 6.489. Repair of Mutation 6.490. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.195. Extra chromosomal elements: plasmids 7.196. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1359 Recombinant DNA technology/genetic engineering 8.1360 Cloning and Cloning vectors 8.1361 Steps in cloning 8.1362 Gene cloning tools (Plasmids, restriction enzymes) 8.1363 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1364 Extraction of DNA,RNA from cells 8.1365 Gel electrophoresis 8.1366 Southern, Northern, Western Blot 8.1367 In Situ Hybridization 8.1368 PCR	Seven

Syllabus				1 Hrs.	Assessment <ul style="list-style-type: none">• Test three		
				5 Hrs.	Independent study		
				1 Hrs	Assignment for reading		
	Eight	Eight	103 Hr.	Lecture Chapter Eight Cont 8.1369 DNA Hybridization 8.1370 Sequencing 8.1371 RFLP and SNP 8.1372 Molecular markers		Eight	
					5 Hrs.		Independent study
					1Hrs		Reading for assignment
	Nine	Nine	6 Hrs.	Laboratory 9.1. Laboratory (Demonstration of Molecular Te		Nine	
					6 Hrs.		Independent study
	Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation		Ten	
					6 Hrs.		Independent study
	Eleven	Eleven	6Hrs	Tutorial		Eleven	
					6 Hrs.		Independent study
	Twelve	Twelve	3 Hrs.	Assessment Final written examination		Twelve	
	Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	Teaching and Learning Methods					

[illegible]

<div> <div></div> <div> <div>Basic Molecular Biology</div> </div> </div>					
	Department	Department	Department	Department of Medical Laboratory Sciences	Department
	Course Title	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)	Course Title
	Program/Target Group	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II	Program/Target Group
	Module Title	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)	Module Title
	Module Coordinator	Module Coordinator	Module Coordinator	Name	Module Coordinator
	Course ECTS	Course ECTS	Course ECTS	5 ECTS	Course ECTS
	Course Information	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting	Course Information

Inst	Instructor	Instructor's Name	_____				Instructor's
Inst Info	Instructor Informati	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Informatio
EtC	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Stud	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Cou	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing are clearly indicate its application in medicine.				Course De
Cou	Course O	Course Objective	203. General Objectives <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> 204. Instructional Objectives <p>At the end of the course, students will be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how they affect gene function Describe the different methods of gene transfer and expression vectors in recombinant DNA technology 				Course Ob

			Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework		
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite
Course Status	Course Status	Course Status	Core		Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <div>1.506. Define terms in molecular biology</div> <div>1.507. Historical overview of molecular biology</div> <div>1.508. Overview of cellular structure and function: Biologically important molecule</div> <div>1.509. Cellular genetic components</div> <div>1.510. The central dogma of molecular biology</div> Chapter Two: DNA as Primary Genetic Material <div>204.1. Experimental basis of DNA</div> <div>204.2. DNA structure and function</div> <div>204.3. DNA Replication and enzymes</div> <div>204.4. Damage and Repair</div>	One
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression	Two

					3.506. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.507. Prokaryotic transcription 3.508. Eukaryotic transcription and translation 3.509. Chromatin structure and eukaryotic transcription 3.510. Post-transcriptional events; RNA splicing polyadenylation	
				1 Hrs.	Assessment <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
	7	Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.506. Translation: Prokaryotic Vs Eukaryotic 4.507. Genetic code 4.508. Protein Structure related to function 4.509. Regulation of Translation 4.510. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.304. Strategies for controlling gene expression 5.305. Regulation of gene expression 5.306. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.506. Types of mutation 6.507. Mutagenic agents 6.508. How mutation affects the genetic code 6.509. Repair of Mutation 6.510. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.203. Extra chromosomal elements: plasmids 7.204. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1415 Recombinant DNA technology/genetic engineering 8.1416 Cloning and Cloning vectors 8.1417 Steps in cloning 8.1418 Gene cloning tools (Plasmids, restriction enzymes) 8.1419 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1420 Extraction of DNA,RNA from cells 8.1421 Gel electrophoresis 8.1422 Southern, Northern, Western Blotting 8.1423 In Situ Hybridization 8.1424 PCR	Seven

				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	107 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1425 DNA Hybridization 8.1426 Sequencing 8.1427 RFLP and SNP 8.1428 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
	E	Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
	T	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
Tea	Teaching	Teaching and Learning Methods • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation)				Teaching : • L • T • D • P • C

Assessment	Assessment	Assessment	Type and Weight (Percentage)	Content	Assessment												
<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<p>Assignment. (15%)</p> <ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%) <p>Group presentation (5%)</p> <p>Three Tests (30%)</p> <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)
Test 1	10%	Day 2															
Test 2	10 %	Day 5															
Test 3	10%	Day 7															
Final exam	50%	Day 13															
Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)	Course Policy	Course Policy												
Reference	Reference	Reference (s)	<p>Required texts:</p> <p>708. Darnel, Lodish, Baltimore. 1994. Molecular Cell Biology. Garland Science, New York.</p> <p>Recommended study books</p> <p>709. Robert F. weaver, Philip W. Anderson. 1997. Molecular Biology of the Cell. Garland Science, New York.</p> <p>710. James D. Watson: Recombinant DNA Technology. Garland Science, New York.</p>	Reference	Reference												

				711. Robert F. Weaver. Molecular Biology 712. Benjamin Lewin: Genes VI 713. Richard J. Epistein: Human 714. P.K. Gupta: Cell and Molec	
App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____		Approval S
Bas ic M ol e c u l a r B io lo g y Dep Cou Prog	Basic Molec ular Biolo gy	• Basic Molecular Biology			Basic Molec ular Biolog y
	Departm	Department	Department of Medical Labor		Departme
	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Tit
	Program/ Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		Program/T Group
	Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Module Ti
	Module C	Module Coordinator	Name		Module Co
	Course Et	Course EtCTS	5 EtCTS		Course EtC
	Course In	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course Inf
	Instructor	Instructor's Name	_____		Instructor's
Instructor Informati	Instructor's Contact Information	Office No. _____ Phone No. _____		Instructor's Informatio	

Gro			E-mail _____				
Mod			Office Hour _____				
Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Cou	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	Student W
Cou				ation		Study	
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De
Inst	Course O	Course Objective	211. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.				Course Ob
Inst Info							
EtC			212. Instructional Objectives At the end of the course, students will be able to				
Stud			Knowledge <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how they affect gene function Describe the different methods of gene transfer and cloning using vectors in recombinant DNA technology 				
Cou			Skill <ul style="list-style-type: none"> Assemble basic materials important in molecular biology Demonstrate molecular techniques 				
Cou							

			Attitude <ul style="list-style-type: none">• Participate actively in discussions and group work• Take responsibility for individual work• Use your time effectively for group and homework			
	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite	
	Course Status	Course Status	Core		Course Status	
	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery	
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics	Day	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none">1.526. Define terms in molecular biology1.527. Historical overview of molecular biology1.528. Overview of cellular structure and functionBiologically important molecule1.529. Cellular genetic components1.530. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material <ul style="list-style-type: none">212.1. Experimental basis of DNA212.2. DNA structure and function212.3. DNA Replication and enzymes212.4. Damage and Repair	One	
			5 Hrs.	Independent study		
			1 Hrs	Assignment for reading		
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression <ul style="list-style-type: none">3.526. Types of RNA molecules & synthesisElongation & Termination mechanism3.527. Prokaryotic transcription	Two	

				3.528. Eukaryotic transcription and translation	
				3.529. Chromatin structure and eukaryotic transcription	
				3.530. Post-transcriptional events; RNA splicing and polyadenylation	
				1 Hrs. Assessment • Test one	
	Three	Three	4 Hrs.	Independent study	Three
			1Hrs	Assignment for reading	
			6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.526. Translation: Prokaryotic Vs Eukaryotic 4.527. Genetic code 4.528. Protein Structure related to function 4.529. Regulation of Translation 4.530. Post-translation Modification	
	Four	Four	4 Hrs.	Written Assignment one	Four
			2 Hrs.	Independent study	
			6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.316. Strategies for controlling gene expression 5.317. Regulation of gene expression 5.318. Regulation of gene expression	
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.526. Types of mutation 6.527. Mutagenic agents 6.528. How mutation affects the genetic code 6.529. Repair of Mutation 6.530. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.211. Extra chromosomal elements: plasmids 7.212. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1471 Recombinant DNA technology/genetic engineering 8.1472 Cloning and Cloning vectors 8.1473 Steps in cloning 8.1474 Gene cloning tools (Plasmids, restriction enzymes) 8.1475 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1476 Extraction of DNA,RNA from cells 8.1477 Gel electrophoresis 8.1478 Southern, Northern, Western Blot 8.1479 In Situ Hybridization 8.1480 PCR	Seven

			1 Hrs.	Assessment • Test three	
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Eight	Eight	111 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1481 DNA Hybridization 8.1482 Sequencing 8.1483 RFLP and SNP 8.1484 Molecular markers	Eight
			5 Hrs.	Independent study	
			1Hrs	Reading for assignment	
	Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
			6 Hrs.	Independent study	
	Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
			6 Hrs.	Independent study	
	Eleven	Eleven	6Hrs	Tutorial	Eleven
			6 Hrs.	Independent study	
	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
	Teaching	Teaching and Learning Methods			Teaching :
	•	• Lecture/ Classroom contact			• L
	•	• Tutorial			• T
	•	• Demonstration			• D
	•	• Presentation and group discussion			• P
	•	• Computer assisted instruction(animation)			• C

		Assessment	Assessment	Type and Weight (Percentage)	Con	Assessment
		<ul style="list-style-type: none">Asses will	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assignment. (15%) <ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%) Group presentation (5%)	<ul style="list-style-type: none">	<ul style="list-style-type: none">Asses will b
	E	assig			•	assign
	T	pres			•	prese
	Tea	cont			•	cont
		and				and f
	Ass					
	<ul style="list-style-type: none">					
				</		

				739. Robert F. Weaver. Molecular Biology 740. Benjamin Lewin: Genes VI 741. Richard J. Epistein: Human 742. P.K. Gupta: Cell and Molec	
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____Date:_____ Name of School/Department head_____ Signature _____Date:_____		Approval S
	Basic Molec ular Biolo gy	Basic Molecular Biology			Basic Molec ular Biolog y
	Cou				
	Ref				
	App				

<div> <div></div> <div> <div>Basic Molecular Biology</div> </div> </div>				
	Department	Department	Department	Department of Medical Laboratory Sciences
	Course Title	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)
	Program/Target Group	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II
	Module Title	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)
	Module Coordinator	Module Coordinator	Module Coordinator	Name
	Course ECTS	Course ECTS	Course ECTS	5 ECTS
	Course Information	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Time

Inst	Instructor	Instructor's Name	_____				Instructor's
Inst Info	Instructor Informati	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Informatio
EtC	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Stud	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Cou	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing are clearly indicate its application in medicine.				Course De
Cou	Course O	Course Objective	219. General Objectives <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> 220. Instructional Objectives <p>At the end of the course, students will be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> • Describe an overview of central dogma of Molecular Biology • Explain basic chemical structure of DNA, RNA and proteins • Explain the mechanisms of DNA replication and the role of enzymes associated in gene replication and expression • Explain causes of mutations in the cell and how they affect gene function • Describe the different methods of gene transfer and the use of vectors in recombinant DNA technology 				Course Ob

			Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework		
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite
Course Status	Course Status	Course Status	Core		Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <div>1.546. Define terms in molecular biology</div> <div>1.547. Historical overview of molecular biology</div> <div>1.548. Overview of cellular structure and function: Biologically important molecule</div> <div>1.549. Cellular genetic components</div> <div>1.550. The central dogma of molecular biology</div> Chapter Two: DNA as Primary Genetic Material <div>220.1. Experimental basis of DNA</div> <div>220.2. DNA structure and function</div> <div>220.3. DNA Replication and enzymes</div> <div>220.4. Damage and Repair</div>	One
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression	Two

					<p>3.546. Types of RNA molecules & synthesis Elongation & Termination mechanism</p> <p>3.547. Prokaryotic transcription</p> <p>3.548. Eukaryotic transcription and translation</p> <p>3.549. Chromatin structure and eukaryotic transcription</p> <p>3.550. Post-transcriptional events; RNA splicing and polyadenylation</p>	
				1 Hrs.	<p>Assessment</p> <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
	7	Three	Three	6Hr.	<p><u>Lecture</u></p> <p>Chapter Four: Genetic code and its translation</p> <p>4.546. Translation: Prokaryotic Vs Eukaryotic</p> <p>4.547. Genetic code</p> <p>4.548. Protein Structure related to function</p> <p>4.549. Regulation of Translation</p> <p>4.550. Post-translation Modification</p>	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<p><u>Lecture</u></p> <p>Chapter Five: - Regulation of gene expression</p> <p>5.328. Strategies for controlling gene expression</p> <p>5.329. Regulation of gene expression</p> <p>5.330. Regulation of gene expression</p>	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.546. Types of mutation 6.547. Mutagenic agents 6.548. How mutation affects the genetic code 6.549. Repair of Mutation 6.550. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.219. Extra chromosomal elements: plasmids 7.220. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1527 Recombinant DNA technology/genetic engineering 8.1528 Cloning and Cloning vectors 8.1529 Steps in cloning 8.1530 Gene cloning tools (Plasmids, restriction enzymes) 8.1531 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1532 Extraction of DNA,RNA from cells 8.1533 Gel electrophoresis 8.1534 Southern, Northern, Western Blot 8.1535 In Situ Hybridization 8.1536 PCR	Seven

				1 Hrs.	Assessment <ul style="list-style-type: none">• Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
I	Eight	Eight	115 Hr.		Lecture Chapter Eight Cont 8.1537 DNA Hybridization 8.1538 Sequencing 8.1539 RFLP and SNP 8.1540 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
	Nine	Nine	6 Hrs.	Laboratory 9.1. Laboratory (Demonstration of Molecular Te	Nine	
			6 Hrs.	Independent study		
	Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation	Ten	
			6 Hrs.	Independent study		
E	Eleven	Eleven	6Hrs	Tutorial	Eleven	
			6 Hrs.	Independent study		
T	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve	
Tea	Teaching	Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)				Teaching :

	Assessment	Assessment	Assessment	Type and Weight (Percentage)	Con	Assessment												
<ul style="list-style-type: none">•	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assignment. (15%) <ul style="list-style-type: none">• Written Assignment 1. (5%) Discuss The different types of PCR variations.• Written Assignment 2 (10%) Group presentation (5%)	<ul style="list-style-type: none">•••••••	<ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)												
				Three Tests (30%) <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<ul style="list-style-type: none">•••••••	
Test 1	10%	Day 2																
Test 2	10 %	Day 5																
Test 3	10%	Day 7																
Final exam	50%	Day 13																
Course Policy	Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)	Course Policy	Course Policy												
Reference	Reference	Reference (s)	Reference (s)	Required texts: 764. Darnel, Lodish, Baltimore. I Recommended study books 765. Robert F. weaver, Philip W. 766. James D. Watson: Recombi	Reference	Reference												

				767. Robert F. Weaver. Molecular Biology 768. Benjamin Lewin: Genes VI 769. Richard J. Epistein: Human 770. P.K. Gupta: Cell and Molec	
App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____Date:____ Name of School/Department head____ Signature _____Date:_____		Approval S
Bas ic M ol e c u la r B io lo g y	Basic Molec ular Biolo gy	• Basic Molecular Biology			Basic Molec ular Biolog y
Dep	Departm	Department	Department of Medical Labor		Departme
Cou	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Tit
Prog	Program/	Program/Target	BSc Degree in Medical Laboratory Sciences		Program/T

Group	Group	Group	Year: II Semester : II				Group
Module	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)				Module Title
Module	Module Coordinator	Module Coordinator	Name				Module Coordinator
Course	Course EtCTS	Course EtCTS	5 EtCTS				Course EtCTS
Course	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting _____				Course Information
Instructor	Instructor's Name	Instructor's Name	_____				Instructor's Name
Instructor Information	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Contact Information
EtCTS	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Student Work Load	Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Student Work Load
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Course Description	Course Description	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course Description
Course Objective	Course Objective	Course Objective	229. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 230. Instructional Objectives At the end of the course, students will be able to				Course Objective

			Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they are repairedDescribe the different methods of gene transfer and vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and home work			
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics			Pre-requisite
Course Status	Course Status	Course Status	Core			Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block			Mode of Delivery
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics		Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none">1.571. Define terms in molecular biology1.572. Historical overview of molecular biology1.573. Overview of cellular structure and functionBiologically important molecule1.574. Cellular genetic components1.575. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material		One

					230.1. Experimental basis of DNA 230.2. DNA structure and function 230.3. DNA Replication and enzymes 230.4. Damage and Repair	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.571. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.572. Prokaryotic transcription 3.573. Eukaryotic transcription and translation 3.574. Chromatin structure and eukaryotic DNA 3.575. Post-transcriptional events; RNA splicing polyadenylation	Two
				1 Hrs.	Assessment <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.571. Translation: Prokaryotic Vs Eukaryotic 4.572. Genetic code 4.573. Protein Structure related to function 4.574. Regulation of Translation 4.575. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression	Four

					5.343. Strategies for controlling gene 5.344. Regulation of gene expression 5.345. Regulation of gene expression	
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.571. Types of mutation 6.572. Mutagenic agents 6.573. How mutation affects the genetic co 6.574. Repair of Mutation 6.575. Mutant isolation and detection Chapter Seven: Gene Transfer and Transpos Elements 7.229. Extra chromosomal elements: plas 7.230. Gene Transfer: conjugation, transfo	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1597 Recombinant DNA technology/gen 8.1598 Cloning and Cloning vectors 8.1599 Steps in cloning 8.1600 Gene cloning tools (Plasmids, restr 8.1601 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	

	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1602 Extraction of DNA,RNA from cell 8.1603 Gel electrophoresis 8.1604 Southern, Northern, Western Blot 8.1605 In Situ Hybridization 8.1606 PCR	Seven
				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
	I	Eight	Eight	120 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1607 DNA Hybridization 8.1608 Sequencing 8.1609 RFLP and SNP 8.1610 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
E	Eleven	Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
T	Twelve	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
Tea	Teaching	Teaching and Learning Methods				Teaching :

	<ul style="list-style-type: none">•••••	<ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)		<ul style="list-style-type: none">• L• T• D• P• C	
Assessment	Assessment <ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assessment <ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none">• Written Assignment 1. (5%) Discuss The different types of PCR variations.• Written Assignment 2 (10%) Group presentation (5%)	Continuous <ul style="list-style-type: none">••••••	Assessment <ul style="list-style-type: none">• Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)
Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)		Course Policy

	Ref	Reference	Reference (s)	Required texts: 799. Darnel, Lodish, Baltimore. J Recommended study books 800. Robert F. weaver, Philip W. 801. James D. Watson: Recombi 802. Robert F. Weaver. Molecu 803. Benjamin Lewin: Genes VI 804. Richard J. Epistein: Human 805. P.K. Gupta: Cell and Molec	Reference
	App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____	Approval S
Bas ic M ol e c u la r B io lo	Basic	Molec ular Biolo gy	• Basic Molecular Biology		Basic
	Departm	Department	Department of Medical Labor		Departme
	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Tit
	Program/	Program/Target	BSc Degree in Medical Laboratory Sciences		Program/T
	Group	Group	Year: II Semester : II		Group
	Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Module Ti
	Module C	Module Coordinator	Name		Module Co
	Course Et	Course EtCTS	5 EtCTS		Course EtC
	Course In	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course Inf

g y Dep Cou Prog Gro Mod Mod Cou Cou Inst Inst Info EtC Stud Cou Cou							
	Instructor	Instructor's Name	_____				Instructor's
	Instructor Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Information
	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme repair and transfer of genes. Basic procedures used in gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De
	Course O	Course Objective	235. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine. 236. Instructional Objectives At the end of the course, students will be able to Knowledge <ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect the cell				Course Ob
	EtC						
	Stud						
Cou							

Knowledge

- Describe an overview of central dogma of Molecular Biology
- Explain basic chemical structure of DNA, RNA and proteins
- Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression
- Explain causes of mutations in the cell and how they affect gene expression

				<ul style="list-style-type: none">Describe the different methods of gene transfer vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework		
	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite	
	Course Status	Course Status	Core		Course Status	
	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery	
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics	Day	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none">1.586. Define terms in molecular biology1.587. Historical overview of molecular biology1.588. Overview of cellular structure and function Biologically important molecule1.589. Cellular genetic components1.590. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material <ul style="list-style-type: none">236.1. Experimental basis of DNA236.2. DNA structure and function236.3. DNA Replication and enzymes236.4. Damage and Repair	One	
			5 Hrs.	Independent study		
			1 Hrs	Assignment for reading		
	Pre-requisite					
	Course Status					
Mode of Delivery						

		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.586. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.587. Prokaryotic transcription 3.588. Eukaryotic transcription and translation 3.589. Chromatin structure and eukaryotic transcription 3.590. Post-transcriptional events; RNA splicing polyadenylation	Two
				1 Hrs.	Assessment <ul style="list-style-type: none"> Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.586. Translation: Prokaryotic Vs Eukaryotic 4.587. Genetic code 4.588. Protein Structure related to function 4.589. Regulation of Translation 4.590. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.352. Strategies for controlling gene expression 5.353. Regulation of gene expression 5.354. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.586. Types of mutation 6.587. Mutagenic agents 6.588. How mutation affects the genetic code 6.589. Repair of Mutation 6.590. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.235. Extra chromosomal elements: plasmids 7.236. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1639 Recombinant DNA technology/genetic engineering 8.1640 Cloning and Cloning vectors 8.1641 Steps in cloning 8.1642 Gene cloning tools (Plasmids, restriction enzymes) 8.1643 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1644 Extraction of DNA,RNA from cells 8.1645 Gel electrophoresis 8.1646 Southern, Northern, Western Blot 8.1647 In Situ Hybridization 8.1648 PCR	Seven

				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	123 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1649 DNA Hybridization 8.1650 Sequencing 8.1651 RFLP and SNP 8.1652 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
		Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
		Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
		Teaching	Teaching and Learning Methods			Teaching :
		•	• Lecture/ Classroom contact			• L
		•	• Tutorial			• T
		•	• Demonstration			• D
		•	• Presentation and group discussion			• P
		•	• Computer assisted instruction(animation)			• C
	E					

	T	Assessment	Assessment	Type and Weight (Percentage)	Con	Assessment													
	Tea	<ul style="list-style-type: none">Asses will assign pres cont and	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assignment. (15%) <ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%) Group presentation (5%)	<ul style="list-style-type: none">	<ul style="list-style-type: none">Asses will b assign prese conti and f													
		Ass	<ul style="list-style-type: none">		Three Tests (30%) <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<ul style="list-style-type: none">	
		Test 1	10%	Day 2															
Test 2	10 %	Day 5																	
Test 3	10%	Day 7																	
Final exam	50%	Day 13																	
		Course Po	Course Policy	Refer in this curriculum.(page)		Course Pol													
		Reference	Reference (s)	Required texts: 820. Darnel, Lodish, Baltimore. I Recommended study books 821. Robert F. weaver, Philip W. 822. James D. Watson: Recombi		Reference													

				823. Robert F. Weaver. Molecular Biology 824. Benjamin Lewin: Genes VI 825. Richard J. Epistein: Human 826. P.K. Gupta: Cell and Molec	
		Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____Date:____ Name of School/Department head____ Signature _____Date:_____	Approval S
	Cou				
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Bas ic M	Basic Molec ular	Basic Molecular Biology			Basic Molec ular

ol e c u la r B io lo g y Dep Cou Prog Gro Mod Mod Cou Cou Inst Inst Info EtC	Biolo gy							Biolog y
	Departm	Department	Department of Medical Labor				Departme	
	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)				Course Tit	
	Program/ Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II				Program/T Group	
	Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)				Module Ti	
	Module C	Module Coordinator	Name				Module Co	
	Course Et	Course EtCTS	5 EtCTS				Course EtC	
	Course In	Course Information	Academic Year : Meeting Day Meeting Time Meeting Me				Course Inf	
	Instructor	Instructor's Name					Instructor's	
	Instructor Information	Instructor's Contact Information	Office No. Phone No. E-mail Office Hour				Instructor's Information	
	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS	
	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W	
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.		
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De	
	Course O	Course Objective	245. General Objectives				Course Ob	

Student Course Course			The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes, and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.			
			246. Instructional Objectives			
			At the end of the course, students will be able to			
			Knowledge			
			<ul style="list-style-type: none">Describe an overview of central dogma of Molecular BiologyExplain basic chemical structure of DNA, RNA and proteinsExplain the mechanisms of DNA replication and transcription, and the enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how they affect gene expressionDescribe the different methods of gene transfer and the use of plasmid vectors in recombinant DNA technology			
			Skill			
			<ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques			
			Attitude			
			<ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework			
		Pre-requisite(s)	Principle of genetics			Pre-requisite(s)
	Course Status	Core			Course Status	
	Mode of Delivery	Block			Mode of Delivery	
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics	Day	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.611. Define terms in molecular biology	One	

<div>Pre-</div> <div>Cou</div> <div>Mod</div> <div></div> <div></div> <div></div>				1.612. Historical overview of molecular biology 1.613. Overview of cellular structure and function Biologically important molecule 1.614. Cellular genetic components 1.615. The central dogma of molecular biology	
				Chapter Two: DNA as Primary Genetic Material 246.1. Experimental basis of DNA 246.2. DNA structure and function 246.3. DNA Replication and enzymes 246.4. Damage and Repair	
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.611. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.612. Prokaryotic transcription 3.613. Eukaryotic transcription and translation 3.614. Chromatin structure and eukaryotic transcription 3.615. Post-transcriptional events; RNA splicing and polyadenylation	Two
			1 Hrs.	Assessment <ul style="list-style-type: none"> Test one 	
			4 Hrs.	Independent study	
			1Hrs	Assignment for reading	
	Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.611. Translation: Prokaryotic Vs Eukaryotic 4.612. Genetic code 4.613. Protein Structure related to function	Three

				4.614. Regulation of Translation 4.615. Post-translation Modification	
			4 Hrs.	Written Assignment one	
			2 Hrs.	Independent study	
	Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.367. Strategies for controlling gene 5.368. Regulation of gene expression 5.369. Regulation of gene expression	Four
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.611. Types of mutation 6.612. Mutagenic agents 6.613. How mutation affects the genetic co 6.614. Repair of Mutation 6.615. Mutant isolation and detection Chapter Seven: Gene Transfer and Transpos Elements 7.245. Extra chromosomal elements: plas 7.246. Gene Transfer: conjugation, transfo	Five
			1 Hrs.	Assessment • Test two	
			4 Hrs.	Independent study	
	Six	Six	1Hrs	Assignment for reading	Six
			6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1709 Recombinant DNA technology/gen 8.1710 Cloning and Cloning vectors 8.1711 Steps in cloning	

				8.1712 Gene cloning tools (Plasmids, restr	
				8.1713 Gene Libraries	
			4 Hrs.	Assignment two written	
			2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	
				<u>Lecture</u> Chapter Eight Cont..... 8.1714 Extraction of DNA,RNA from cell 8.1715 Gel electrophoresis 8.1716 Southern, Northern, Western Blot 8.1717 In Situ Hybridization 8.1718 PCR	
				1 Hrs.	
				Assessment • Test three	
				5 Hrs.	
				Independent study	
				1 Hrs	
				Assignment for reading	
		Eight	Eight	128 Hr.	
				<u>Lecture</u> Chapter Eight Cont 8.1719 DNA Hybridization 8.1720 Sequencing 8.1721 RFLP and SNP 8.1722 Molecular markers	
				5 Hrs.	
				Independent study	
				1Hrs	
				Reading for assignment	
		Nine	Nine	6 Hrs.	
				<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	
				6 Hrs.	
				Independent study	
		Ten	Ten	6 Hrs.	
				Assessment • Group presentation	
				6 Hrs.	
				Independent study	
		Eleven	Eleven	6Hrs	
				Tutorial	
				6 Hrs.	
				Independent study	

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	Course Po	Course Policy	Refer in this curriculum.(page)		Course Pol
	Reference	Reference (s)	Required texts: 855. Darnel, Lodish, Baltimore. I Recommended study books 856. Robert F. weaver, Philip W. 857. James D. Watson: Recombi 858. Robert F. Weaver. Molecu 859. Benjamin Lewin: Genes VI 860. Richard J. Epistein: Human 861. P.K. Gupta: Cell and Molec		Reference
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____Date:____ Name of School/Department head _____ Signature _____Date:____		Approval S
	Cou Ref				
	Basic Molec ular	• Basic Molecular Biology			Basic Molec ular

Basic Molecular Biology	App	Biolo						Biolog
		gy						y
		Departm	Department	Department of Medical Labor				Departme
		Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)				Course Tit
		Program/	Program/Target	BSc Degree in Medical Laboratory Sciences				Program/T
		Group	Group	Year: II Semester : II				Group
		Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)				Module Ti
		Module C	Module Coordinator	Name				Module Co
		Course Et	Course EtCTS	5 EtCTS				Course EtC
		Course In	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me				Course Inf
		Instructor	Instructor's Name	_____				Instructor's
		Instructor	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's
	Information						Information	
EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS		
Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W		
		48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.			
Course D	Course Description	The course describes components and structu replication, transcription and translation and enzy in prokaryotes and eukaryotes. The course also repair and transfer of genes. Basic procedures use gene extraction, gene cloning, PCR and sequence clearly indicate its application in medicine.				Course De		
Course O	Course Objective	251. General Objectives				Course Ob		
Dep								
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<div>Pre-</div> <div>Cou</div> <div>Mod</div> <div></div> <div></div>				1.627. Historical overview of molecular biology 1.628. Overview of cellular structure and function Biologically important molecule 1.629. Cellular genetic components 1.630. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 252.1. Experimental basis of DNA 252.2. DNA structure and function 252.3. DNA Replication and enzymes 252.4. Damage and Repair	
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.626. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.627. Prokaryotic transcription 3.628. Eukaryotic transcription and translation 3.629. Chromatin structure and eukaryotic transcription 3.630. Post-transcriptional events; RNA splicing and polyadenylation	Two
			1 Hrs.	Assessment <ul style="list-style-type: none"> Test one 	
			4 Hrs.	Independent study	
			1Hrs	Assignment for reading	
	Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.626. Translation: Prokaryotic Vs Eukaryotic 4.627. Genetic code 4.628. Protein Structure related to function	Three

				4.629. Regulation of Translation 4.630. Post-translation Modification	
			4 Hrs.	Written Assignment one	
			2 Hrs.	Independent study	
	Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.376. Strategies for controlling gene 5.377. Regulation of gene expression 5.378. Regulation of gene expression	Four
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.626. Types of mutation 6.627. Mutagenic agents 6.628. How mutation affects the genetic co 6.629. Repair of Mutation 6.630. Mutant isolation and detection Chapter Seven: Gene Transfer and Transpos Elements 7.251. Extra chromosomal elements: plas 7.252. Gene Transfer: conjugation, transfo	Five
			1 Hrs.	Assessment • Test two	
			4 Hrs.	Independent study	
	Six	Six	1Hrs	Assignment for reading	Six
			6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1751 Recombinant DNA technology/gen 8.1752 Cloning and Cloning vectors 8.1753 Steps in cloning	

				8.1754 Gene cloning tools (Plasmids, restr	
				8.1755 Gene Libraries	
			4 Hrs.	Assignment two written	
			2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	
				<u>Lecture</u> Chapter Eight Cont..... 8.1756 Extraction of DNA,RNA from cell 8.1757 Gel electrophoresis 8.1758 Southern, Northern, Western Blot 8.1759 In Situ Hybridization 8.1760 PCR	
				1 Hrs.	
				Assessment • Test three	
				5 Hrs.	
				Independent study	
				1 Hrs	
				Assignment for reading	
		Eight	Eight	131 Hr.	
				<u>Lecture</u> Chapter Eight Cont 8.1761 DNA Hybridization 8.1762 Sequencing 8.1763 RFLP and SNP 8.1764 Molecular markers	
				5 Hrs.	
				Independent study	
				1Hrs	
				Reading for assignment	
		Nine	Nine	6 Hrs.	
				<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	
				6 Hrs.	
				Independent study	
		Ten	Ten	6 Hrs.	
				Assessment • Group presentation	
				6 Hrs.	
				Independent study	
		Eleven	Eleven	6Hrs	
				Tutorial	
				6 Hrs.	
				Independent study	

<div>Ass</div> <div>•</div>					
	Course Po	Course Policy	Refer in this curriculum.(page)	Course Pol	
	Reference	Reference (s)	Required texts: 876. Darnel, Lodish, Baltimore. I Recommended study books 877. Robert F. weaver, Philip W. 878. James D. Watson: Recombi 879. Robert F. Weaver. Molecu 880. Benjamin Lewin: Genes VI 881. Richard J. Epistein: Human 882. P.K. Gupta: Cell and Molec	Reference	
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____Date:____ Name of School/Department head____ Signature _____Date:____	Approval S	
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	Ref				
	App				
Basic Molecular Biology	Basic Molecular Biology	<ul style="list-style-type: none"> Basic Molecular Biology 			Basic Molecular Biology
	Department	Department	Department of Medical Laboratory Sciences		Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Title
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		Program/Target Group
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Module Title
	Module Coordinator	Module Coordinator	Name		Module Coordinator
	Course EtCTS	Course EtCTS	5 EtCTS		Course EtCTS
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting		Course Information

y								
	Dep	Instructor	Instructor's Name	_____				Instructor's
	Cou	Instructor	Instructor's Contact	Office No. _____				Instructor's
	Prog	Information	Information	Phone No. _____				Information
	Gro			E-mail _____				
	Mod			Office Hour _____				
	Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
	Cou	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	Student W
	Cou				ation		Study	
				48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme repair and transfer of genes. Basic procedures used in gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De	
Inst								
Inst								
Info								
EtC	Course O	Course Objective	259. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.				Course Ob	
Stud			260. Instructional Objectives At the end of the course, students will be able to					
			Knowledge					
			<ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription Explain the role of enzymes associated in gene replication and expression Explain causes of mutations in the cell and how they affect the function of the cell 					
Cou								

				<ul style="list-style-type: none">Describe the different methods of gene transfer vectors in recombinant DNA technology Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework		
	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite	
	Course Status	Course Status	Core		Course Status	
	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery	
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics	Day	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none">1.646. Define terms in molecular biology1.647. Historical overview of molecular biology1.648. Overview of cellular structure and function Biologically important molecule <ul style="list-style-type: none">1.649. Cellular genetic components1.650. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material <ul style="list-style-type: none">260.1. Experimental basis of DNA260.2. DNA structure and function260.3. DNA Replication and enzymes260.4. Damage and Repair	One	
	Pre-requisite		5 Hrs.	Independent study		
	Course Status		1 Hrs	Assignment for reading		
	Mode of Delivery					

		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.646. Types of RNA molecules & synthesis Elongation & Termination mechanism 3.647. Prokaryotic transcription 3.648. Eukaryotic transcription and translation 3.649. Chromatin structure and eukaryotic transcription 3.650. Post-transcriptional events; RNA splicing polyadenylation	Two
				1 Hrs.	Assessment <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.646. Translation: Prokaryotic Vs Eukaryotic 4.647. Genetic code 4.648. Protein Structure related to function 4.649. Regulation of Translation 4.650. Post-translation Modification	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.388. Strategies for controlling gene expression 5.389. Regulation of gene expression 5.390. Regulation of gene expression	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.646. Types of mutation 6.647. Mutagenic agents 6.648. How mutation affects the genetic code 6.649. Repair of Mutation 6.650. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.259. Extra chromosomal elements: plasmids 7.260. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1807 Recombinant DNA technology/genetic engineering 8.1808 Cloning and Cloning vectors 8.1809 Steps in cloning 8.1810 Gene cloning tools (Plasmids, restriction enzymes) 8.1811 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1812 Extraction of DNA,RNA from cells 8.1813 Gel electrophoresis 8.1814 Southern, Northern, Western Blot 8.1815 In Situ Hybridization 8.1816 PCR	Seven

				1 Hrs.	Assessment <ul style="list-style-type: none">• Test three				
				5 Hrs.	Independent study				
				1 Hrs	Assignment for reading				
		Eight	Eight	135 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1817 DNA Hybridization 8.1818 Sequencing 8.1819 RFLP and SNP 8.1820 Molecular markers				
					5 Hrs.		Independent study		
					1Hrs		Reading for assignment		
					Nine		Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te
								6 Hrs.	Independent study
		Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation				
				6 Hrs.	Independent study				
		Eleven	Eleven	6Hrs	Tutorial				
				6 Hrs.	Independent study				
		Twelve	Twelve	3 Hrs.	Assessment Final written examination				
		Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)	Teaching and Learning Methods				Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)		

		Assessment <ul style="list-style-type: none">Assessment will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assessment <ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Type and Weight (Percentage)			Con <ul style="list-style-type: none">	Assessment <ul style="list-style-type: none">Asseswill bassignpresecontinand f												
	E			Assignment. (15%) <ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%)																
	T			Group presentation (5%)																
	Tea			Three Tests (30%) <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>					Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13
	Test 1			10%	Day 2															
Test 2	10 %	Day 5																		
Test 3	10%	Day 7																		
Final exam	50%	Day 13																		
Ass <ul style="list-style-type: none">																				
	Course Po	Course Policy	Refer in this curriculum.(page)			Course Pol														
	Reference	Reference (s)	Required texts: 904. Darnel, Lodish, Baltimore. I Recommended study books 905. Robert F. weaver, Philip W. 906. James D. Watson: Recombi			Reference														

<div> <div></div> <div> <div>Basic Molecular Biology</div> </div> </div>					
	Department	Department	Department	Department of Medical Laboratory Sciences	Department
	Course Title	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)	Course Title
	Program/Target Group	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II	Program/Target Group
	Module Title	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)	Module Title
	Module Coordinator	Module Coordinator	Module Coordinator	Name	Module Coordinator
	Course ECTS	Course ECTS	Course ECTS	5 ECTS	Course ECTS
	Course Information	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting	Course Information

Inst	Instructor	Instructor's Name	_____				Instructor's
Inst Info	Instructor Informati	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				Instructor's Informatio
EtC	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Stud	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Student W
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
Cou	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequencing are clearly indicate its application in medicine.				Course De
Cou	Course O	Course Objective	269. General Objectives <p>The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> 270. Instructional Objectives <p>At the end of the course, students will be able to</p> <p>Knowledge</p> <ul style="list-style-type: none"> • Describe an overview of central dogma of Molecular Biology • Explain basic chemical structure of DNA, RNA and proteins • Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression • Explain causes of mutations in the cell and how they affect gene function • Describe the different methods of gene transfer and the use of vectors in recombinant DNA technology 				Course Ob

			Skill <ul style="list-style-type: none">Assemble basic materials important in molecular biologyDemonstrate molecular techniques Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework		
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics		Pre-requisite
Course Status	Course Status	Course Status	Core		Course Status
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	Day
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.671. Define terms in molecular biology 1.672. Historical overview of molecular biology 1.673. Overview of cellular structure and function: Biologically important molecule 1.674. Cellular genetic components 1.675. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 270.1. Experimental basis of DNA 270.2. DNA structure and function 270.3. DNA Replication and enzymes 270.4. Damage and Repair	One
			5 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression	Two

					<p>3.671. Types of RNA molecules & synthesis Elongation & Termination mechanism</p> <p>3.672. Prokaryotic transcription</p> <p>3.673. Eukaryotic transcription and translation</p> <p>3.674. Chromatin structure and eukaryotic transcription</p> <p>3.675. Post-transcriptional events; RNA splicing and polyadenylation</p>	
				1 Hrs.	<p>Assessment</p> <ul style="list-style-type: none"> • Test one 	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
	7	Three	Three	6Hr.	<p><u>Lecture</u></p> <p>Chapter Four: Genetic code and its translation</p> <p>4.671. Translation: Prokaryotic Vs Eukaryotic</p> <p>4.672. Genetic code</p> <p>4.673. Protein Structure related to function</p> <p>4.674. Regulation of Translation</p> <p>4.675. Post-translation Modification</p>	Three
				4 Hrs.	Written Assignment one	
				2 Hrs.	Independent study	
		Four	Four	6 Hrs.	<p><u>Lecture</u></p> <p>Chapter Five: - Regulation of gene expression</p> <p>5.403. Strategies for controlling gene expression</p> <p>5.404. Regulation of gene expression</p> <p>5.405. Regulation of gene expression</p>	Four
				6 Hrs.	Independent study	
				1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.671. Types of mutation 6.672. Mutagenic agents 6.673. How mutation affects the genetic code 6.674. Repair of Mutation 6.675. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.269. Extra chromosomal elements: plasmids 7.270. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1877 Recombinant DNA technology/genetic engineering 8.1878 Cloning and Cloning vectors 8.1879 Steps in cloning 8.1880 Gene cloning tools (Plasmids, restriction enzymes) 8.1881 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1882 Extraction of DNA,RNA from cells 8.1883 Gel electrophoresis 8.1884 Southern, Northern, Western Blotting 8.1885 In Situ Hybridization 8.1886 PCR	Seven

				1 Hrs.	Assessment • Test three	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	140 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1887 DNA Hybridization 8.1888 Sequencing 8.1889 RFLP and SNP 8.1890 Molecular markers	Eight
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Te	Nine
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment • Group presentation	Ten
				6 Hrs.	Independent study	
	E	Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
	T	Twelve	Twelve	3 Hrs.	Assessment Final written examination	Twelve
Tea	Teaching	Teaching and Learning Methods • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation)				Teaching : • L • T • D • P • C

Assessment	Assessment	Assessment	Type and Weight (Percentage)	Content	Assessment												
<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<p>Assignment. (15%)</p> <ul style="list-style-type: none">Written Assignment 1. (5%) Discuss The different types of PCR variations.Written Assignment 2 (10%) <p>Group presentation (5%)</p> <p>Three Tests (30%)</p> <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	<ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)
Test 1	10%	Day 2															
Test 2	10 %	Day 5															
Test 3	10%	Day 7															
Final exam	50%	Day 13															
Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)	Course Policy	Course Policy												
Reference	Reference	Reference (s)	<p>Required texts:</p> <p>939. Darnel, Lodish, Baltimore. Molecular Cell Biology, 6th edition, Garland Science, 2014.</p> <p>Recommended study books</p> <p>940. Robert F. weaver, Philip W. Anderson. Molecular Biology of the Cell, 6th edition, Garland Science, 2015.</p> <p>941. James D. Watson: Recombinant DNA Technology, 2nd edition, Garland Science, 2013.</p>	Reference	Reference												

				942. Robert F. Weaver. Molecular Biology 943. Benjamin Lewin: Genes VI 944. Richard J. Epstein: Human 945. P.K. Gupta: Cell and Molec	
App	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____		Approval S
Basic Molecular Biology	Basic Molecular Biology	• Basic Molecular Biology			Basic Molecular Biology
	Department	Department	Department of Medical Labor		Department
	Course Title	Course Title /Code	Basic Molecular Biology (MeLS2102)		Course Tit
	Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II		Program/T Group
	Module Title	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)		Module Ti
	Module Coordinator	Module Coordinator	Name		Module Co
	Course EtCTS	Course EtCTS	5 EtCTS		Course EtC
	Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Me		Course Inf
	Instructor's Name	Instructor's Name	_____		Instructor's
	Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____		Instructor's Information

Gro			E-mail _____				
Mod			Office Hour _____				
Mod	EtCTS	EtCTS	5 CP/ 135 Hrs.				EtCTS
Cou	Student W	Student Work Load	Lecture	Demonstr	Tutorial	Independent	Student W
Cou				ation		Study	
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	
	Course D	Course Description	The course describes components and structure of DNA replication, transcription and translation and enzyme function in prokaryotes and eukaryotes. The course also covers DNA repair and transfer of genes. Basic procedures used in molecular biology such as gene extraction, gene cloning, PCR and sequence analysis clearly indicate its application in medicine.				Course De
Inst	Course O	Course Objective	275. General Objectives The student will be able to describe the central dogma of molecular biology, gene replication and expressions both in prokaryotes and eukaryotes. The student will be able to perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.				Course Ob
Inst Info							
EtC			276. Instructional Objectives At the end of the course, students will be able to				
Stud			Knowledge <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular Biology Explain basic chemical structure of DNA, RNA and proteins Explain the mechanisms of DNA replication and transcription and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how they affect gene function Describe the different methods of gene transfer and cloning using vectors in recombinant DNA technology 				
Cou			Skill <ul style="list-style-type: none"> Assemble basic materials important in molecular biology Demonstrate molecular techniques 				
Cou							

			Attitude <ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework			
	Pre-requisite(s)	Pre-requisite(s)	Principle of genetics		Pre-requisite(s)	
	Course Status	Course Status	Core		Course Status	
	Mode of Delivery	Mode of Delivery	Block		Mode of Delivery	
		Schedule				
	Day	Day	Contact Hour	Topics and Sub Topics	Day	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <div>1.686. Define terms in molecular biology</div> <div>1.687. Historical overview of molecular biology</div> <div>1.688. Overview of cellular structure and function</div> <div>Biologically important molecule</div> <div>1.689. Cellular genetic components</div> <div>1.690. The central dogma of molecular biology</div> Chapter Two: DNA as Primary Genetic Material <div>276.1. Experimental basis of DNA</div> <div>276.2. DNA structure and function</div> <div>276.3. DNA Replication and enzymes</div> <div>276.4. Damage and Repair</div>	One	
			5 Hrs.	Independent study		
			1 Hrs	Assignment for reading		
	Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression <div>3.686. Types of RNA molecules & synthesis</div> <div>Elongation & Termination mechanism</div> <div>3.687. Prokaryotic transcription</div>	Two	

				3.688. Eukaryotic transcription and translation	
				3.689. Chromatin structure and eukaryotic transcription	
				3.690. Post-transcriptional events; RNA splicing and polyadenylation	
				1 Hrs. Assessment • Test one	
	Three	Three	4 Hrs.	Independent study	Three
			1Hrs	Assignment for reading	
			6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.686. Translation: Prokaryotic Vs Eukaryotic 4.687. Genetic code 4.688. Protein Structure related to function 4.689. Regulation of Translation 4.690. Post-translation Modification	
	Four	Four	4 Hrs.	Written Assignment one	Four
			2 Hrs.	Independent study	
			6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.412. Strategies for controlling gene expression 5.413. Regulation of gene expression 5.414. Regulation of gene expression	
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	

		Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.686. Types of mutation 6.687. Mutagenic agents 6.688. How mutation affects the genetic code 6.689. Repair of Mutation 6.690. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposon Elements 7.275. Extra chromosomal elements: plasmids 7.276. Gene Transfer: conjugation, transformation	Five
				1 Hrs.	Assessment • Test two	
				4 Hrs.	Independent study	
				1Hrs	Assignment for reading	
		Six	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1919 Recombinant DNA technology/genetic engineering 8.1920 Cloning and Cloning vectors 8.1921 Steps in cloning 8.1922 Gene cloning tools (Plasmids, restriction enzymes) 8.1923 Gene Libraries	Six
				4 Hrs.	Assignment two written	
				2 Hrs.	Independent study	
		Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1924 Extraction of DNA,RNA from cells 8.1925 Gel electrophoresis 8.1926 Southern, Northern, Western Blot 8.1927 In Situ Hybridization 8.1928 PCR	Seven

S	I			1 Hrs.	Assessment	
				5 Hrs.	Independent study	
				1 Hrs	Assignment for reading	
		Eight	Eight	143 Hr.	Lecture	Eight
					Chapter Eight Cont	
					8.1929 DNA Hybridization	
					8.1930 Sequencing	
					8.1931 RFLP and SNP	
					8.1932 Molecular markers	
				5 Hrs.	Independent study	
				1Hrs	Reading for assignment	
		Nine	Nine	6 Hrs.	Laboratory	Nine
					9.1. Laboratory (Demonstration of Molecular Te	
				6 Hrs.	Independent study	
		Ten	Ten	6 Hrs.	Assessment	Ten
					• Group presentation	
				6 Hrs.	Independent study	
		Eleven	Eleven	6Hrs	Tutorial	Eleven
				6 Hrs.	Independent study	
		Twelve	Twelve	3 Hrs.	Assessment	Twelve
					Final written examination	
		Teaching	Teaching and Learning Methods			Teaching :
		•	• Lecture/ Classroom contact			• L
		•	• Tutorial			• T
		•	• Demonstration			• D
		•	• Presentation and group discussion			• P
		•	• Computer assisted instruction(animation)			• C
		Tea				

[illegible]

Ref				963. Robert F. Weaver. Molecular Biology 964. Benjamin Lewin: Genes VI 965. Richard J. Epistein: Human 966. P.K. Gupta: Cell and Molec	
	Approval	Approval Section	Name of Module Coordinator/Course tea Signature _____Date:_____ Name of School/Department head_____ Signature _____Date:_____		Approval S
	App				
Bas ic M ol e c u la r B io lo g	Basic Molec ular Biolo gy	Basic Molecular Biology			

y								
Dep	Departm	Department	Department of Medical Laboratory Sciences					
Cou	Course Ti	Course Title /Code	Basic Molecular Biology (MeLS2102)					
Prog	Program/	Program/Target	BSc Degree in Medical Laboratory Sciences					
Gro	Group	Group	Year: II Semester : II					
Mod	Module T	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)					
Mod	Module C	Module Coordinator	Name					
Cou	Course Et	Course EtCTS	5 EtCTS					
Cou	Course In	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location					
Instr	Instructor	Instructor's Name	_____					
Instr	Instructor	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____					
EtC	EtCTS	EtCTS	5 CP/ 135 Hrs.					
Stud	Student W	Student Work Load	Lecture	Demonstr ation	Tutorial	Independent Study	Assignm ent	A
			48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.	1
Cou	Course D	Course Description	The course describes components and structures of the n replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes ex repair and transfer of genes. Basic procedures used in molecula gene extraction, gene cloning, PCR and sequence analysis will clearly indicate its application in medicine.					
Cou	Course O	Course Objective	283. General Objectives The student will be able to describe the central dogma of n					

			gene replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.		
			284. Instructional Objectives		
			At the end of the course, students will be able to:		
			Knowledge		
			<ul style="list-style-type: none">Describe an overview of central dogma of Molecular biologyExplain basic chemical structure of DNA, RNAExplain the mechanisms of DNA replication, transcription and translation and enzymes associated in gene replication and expressionExplain causes of mutations in the cell and how some of them are inheritedDescribe the different methods of gene transfer and the importance of vectors in recombinant DNA technology		
			Skill		
			<ul style="list-style-type: none">Assemble basic materials important in molecular techniquesDemonstrate molecular techniques		
			Attitude		
			<ul style="list-style-type: none">Participate actively in discussions and group workTake responsibility for individual workUse your time effectively for group and homework to complete assignments		
Pre-requisite	Pre-requisite	Pre-requisite(s)	Principle of genetics		
Course Status	Course Status	Course Status	Core		
Mode of Delivery	Mode of Delivery	Mode of Delivery	Block		
		Schedule			
	Day	Day	Contact Hour	Topics and Sub Topics	
	One	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction 1.706. Define terms in molecular biology 1.707. Historical overview of molecular biology	

					1.708. Overview of cellular structure and function, Biologically important molecule 1.709. Cellular genetic components 1.710. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 284.1. Experimental basis of DNA 284.2. DNA structure and function 284.3. DNA Replication and enzymes involved 284.4. Damage and Repair
					5 Hrs. Independent study
					1 Hrs Assignment for reading
		Two	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.706. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.707. Prokaryotic transcription 3.708. Eukaryotic transcription and transcription factors 3.709. Chromatin structure and eukaryotic transcription 3.710. Post-transcriptional events; RNA splicing; capping polyadenylation
				1 Hrs.	Assessment <ul style="list-style-type: none"> Test one
				4 Hrs.	Independent study
				1Hrs	Assignment for reading
	T	Three	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.706. Translation: Prokaryotic Vs Eukaryotic 4.707. Genetic code 4.708. Protein Structure related to function 4.709. Regulation of Translation

					4.710. Post-translation Modification
				4 Hrs.	Written Assignment one
				2 Hrs.	Independent study
	Four	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.424. Strategies for controlling gene expression 5.425. Regulation of gene expression in Prokaryotes 5.426. Regulation of gene expression in eukaryotes	
			6 Hrs.	Independent study	
			1 Hrs	Assignment for reading	
	Five	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.706. Types of mutation 6.707. Mutagenic agents 6.708. How mutation affects the genetic code? 6.709. Repair of Mutation 6.710. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.283. Extra chromosomal elements: plasmid, transposon 7.284. Gene Transfer: conjugation, transformation, transduction	
			1 Hrs.	Assessment • Test two	
			4 Hrs.	Independent study	
	Six	Six	1Hrs	Assignment for reading	
			6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1975 Recombinant DNA technology/genetic engineering 8.1976 Cloning and Cloning vectors 8.1977 Steps in cloning 8.1978 Gene cloning tools (Plasmids, restriction enzymes)	

					8.1979 Gene Libraries
				4 Hrs.	Assignment two written
				2 Hrs.	Independent study
	S	Seven	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1980 Extraction of DNA,RNA from cells, 8.1981 Gel electrophoresis 8.1982 Southern, Northern, Western Blot 8.1983 In Situ Hybridization 8.1984 PCR
				1 Hrs.	Assessment <ul style="list-style-type: none"> • Test three
				5 Hrs.	Independent study
				1 Hrs	Assignment for reading
	I	Eight	Eight	147 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1985 DNA Hybridization 8.1986 Sequencing 8.1987 RFLP and SNP 8.1988 Molecular markers
				5 Hrs.	Independent study
				1Hrs	Reading for assignment
		Nine	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
				6 Hrs.	Independent study
		Ten	Ten	6 Hrs.	Assessment <ul style="list-style-type: none"> • Group presentation
				6 Hrs.	Independent study
	E	Eleven	Eleven	6Hrs	Tutorial
				6 Hrs.	Independent study

	T	Twelve	Twelve	3 Hrs.	Assessment
					Final written examination
	Tea	Teaching	Teaching and Learning Methods		
		<ul style="list-style-type: none"> • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation) 			
	Ass	Assessme	Assessment	Type and Weight (Percentage)	Competence to be
	•	• Asses	• Assessment in this course	Assignment. (15%)	• Describe the
		will	will be based on written	• Written Assignment 1.	central dogm
		assign	assignments (15%), group	(5%)	biology
		pres	presentation (5%), three	Discuss The different types	• Explain basic
		cont	continuous tests (30%)	of PCR variations.	of DNA, RN
		and	and final exam (50%)	• Written Assignment 2	• Explain the n
				(10%)	replication, tr
				Group presentation (5%)	translation an
				Three Tests (30%)	associated in
				Test 1 10% Day 2	and expressio
				Test 2 10 % Day 5	• Explain caus
				Test 3 10% Day 7	the cell and h
				Final exam 50% Day 13	can be repair
					• Describe the
					of gene trans
					importance o
					• vectors in re
					technology
					• Assemble ba
					important in
					techniques

					<ul style="list-style-type: none">Demonstrate techniques
Course Policy	Course Policy	Course Policy	Refer in this curriculum.(page)		
Reference	Reference	Reference (s)	Required texts: 988. Darnel, Lodish, Baltimore. Molecular Cell Recommended study books 989. Robert F. weaver, Philip W. Hedrick. Gen 990. James D. Watson: Recombinant DNA 991. Robert F. Weaver. Molecular biology 992. Benjamin Lewin: Genes VI and above 993. Richard J. Epistein: Human Molecular Bio 994. P.K. Gupta: Cell and Molecular Biology		
Approval	Approval	Approval Section	Name of Module Coordinator/Course team leader: _____ Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____		
Basic	Basic Molecular	Basic Molecular Biology			

M o l e c u l a r B i o l o g y	Biolo gy		
		Department of Medical Laboratory Sciences	
Department		Department of Medical Laboratory Sciences	
Course Title /Code		Basic Molecular Biology (MeLS2102)	
Program/Target		BSc Degree in Medical Laboratory Sciences	
Group		Year: II Semester : II	
Module Title (Code)		Immunology and Molecular Biology (MeLSM2109)	
Module Coordinator		Name	
Course EtCTS		5 EtCTS	
Course Information		Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location: <div style="text-align: right;">Class Room _____</div> <div style="text-align: right;">Lab Room _____</div>	
Instructor's Name		_____	
Instructor's Contact Information		Office No. _____ Phone No. _____ E-mail _____ Office Hour _____	

EtCTS	5 CP/ 135 Hrs.						
Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment	Assessment	Total
	48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.	12 Hrs.	135 Hrs.
Course Description	The course describes components and structures of the nucleic acids, DNA replication, transcription and translation and enzymes involved in the process both in prokaryotes and eukaryotes. The course also describes expression, mutation, repair and transfer of genes. Basic procedures used in molecular biology including gene extraction, gene cloning, PCR and sequence analysis will also be described to clearly indicate its application in medicine.						
Course Objective	<p>285. General Objectives</p> <p>The student will be able to describe the central dogma of molecular biology in gene replication and expressions both in prokaryotes and eukaryotes and how to perform molecular techniques in the diagnosis and treatment of microbial and genetic diseases in modern medicine.</p> <p>286. Instructional Objectives</p> <p>At the end of the course, students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them can be repaired Describe the different methods of gene transfer and the importance of different vectors in recombinant DNA technology <p>Skill</p> <ul style="list-style-type: none"> Assemble basic materials important in molecular techniques Demonstrate molecular techniques <p>Attitude</p> <ul style="list-style-type: none"> Participate actively in discussions and group work 						

		<ul style="list-style-type: none"> • Take responsibility for individual work • Use your time effectively for group and homework to complete assignments on ti 	
Pre-requisite(s)		Principle of genetics	
Course Status		Core	
Mode of Delivery		Block	
Schedule			
Day	Contact Hour	Topics and Sub Topics	Referenc e(s)
One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none"> 1.711. Define terms in molecular biology 1.712. Historical overview of molecular biology 1.713. Overview of cellular structure and function, Biologically important molecule 1.714. Cellular genetic components 1.715. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material <ul style="list-style-type: none"> 286.1. Experimental basis of DNA 286.2. DNA structure and function 286.3. DNA Replication and enzymes involved 286.4. Damage and Repair 	Ref No 2
	5 Hrs.	Independent study	
	1 Hrs	Assignment for reading	
Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression <ul style="list-style-type: none"> 3.711. Types of RNA molecules & synthesis (Initiation, Elongation & Termination mechanism) 3.712. Prokaryotic transcription 3.713. Eukaryotic transcription and transcription factors 3.714. Chromatin structure and eukaryotic transcription 	Ref No 2

			3.715. Post-transcriptional events; RNA splicing; capping; & polyadenylation	
		1 Hrs.	Assessment • Test one	
		4 Hrs.	Independent study	
		1Hrs	Assignment for reading	
	Three	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.711. Translation: Prokaryotic Vs Eukaryotic 4.712. Genetic code 4.713. Protein Structure related to function 4.714. Regulation of Translation 4.715. Post-translation Modification	Ref No 2
		4 Hrs.	Written Assignment one	
		2 Hrs.	Independent study	
	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.427. Strategies for controlling gene expression 5.428. Regulation of gene expression in Prokaryotes 5.429. Regulation of gene expression in eukaryotes	Ref No 2
		6 Hrs.	Independent study	
		1 Hrs	Assignment for reading	

Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.711. Types of mutation 6.712. Mutagenic agents 6.713. How mutation affects the genetic code? 6.714. Repair of Mutation 6.715. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.285. Extra chromosomal elements: plasmid, transposons 7.286. Gene Transfer: conjugation, transformation, transduction	Ref No 2
	1 Hrs.	Assessment • Test two	
	4 Hrs.	Independent study	
	1Hrs	Assignment for reading	
Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.1989 Recombinant DNA technology/genetic engineering 8.1990 Cloning and Cloning vectors 8.1991 Steps in cloning 8.1992 Gene cloning tools (Plasmids, restriction enzymes, etc) 8.1993 Gene Libraries	Ref No 2
	4 Hrs.	Assignment two written	
	2 Hrs.	Independent study	
Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.1994 Extraction of DNA,RNA from cells, 8.1995 Gel electrophoresis 8.1996 Southern, Northern, Western Blot 8.1997 In Situ Hybridization 8.1998 PCR	Ref No 2

	1 Hrs.	Assessment <ul style="list-style-type: none">• Test three	
	5 Hrs.	Independent study	
	1 Hrs	Assignment for reading	
Eight	148 Hr.	<u>Lecture</u> Chapter Eight Cont 8.1999 DNA Hybridization 8.2000 Sequencing 8.2001 RFLP and SNP 8.2002 Molecular markers	Ref No 2
	5 Hrs.	Independent study	
	1Hrs	Reading for assignment	
Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)	
	6 Hrs.	Independent study	
Ten	6 Hrs.	Assessment <ul style="list-style-type: none">• Group presentation	
	6 Hrs.	Independent study	
Eleven	6Hrs	Tutorial	
	6 Hrs.	Independent study	
Twelve	3 Hrs.	Assessment Final written examination	
Teaching and Learning Methods <ul style="list-style-type: none"> • Lecture/ Classroom contact • Tutorial • Demonstration • Presentation and group discussion • Computer assisted instruction(animation) 			

<p>Assessment</p> <ul style="list-style-type: none"> Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%) 	<p>Type and Weight (Percentage)</p> <p>Assignment. (15%)</p> <ul style="list-style-type: none"> Written Assignment 1. (5%) Discuss The different types of PCR variations. Written Assignment 2 (10%) <p>Group presentation (5%)</p> <hr/> <p>Three Tests (30%)</p> <table border="0"> <tr> <td>Test 1</td> <td>10%</td> <td>Day 2</td> </tr> <tr> <td>Test 2</td> <td>10 %</td> <td>Day 5</td> </tr> <tr> <td>Test 3</td> <td>10%</td> <td>Day 7</td> </tr> <tr> <td>Final exam</td> <td>50%</td> <td>Day 13</td> </tr> </table>	Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%	Day 13	<p>Competence to be assessed</p> <ul style="list-style-type: none"> Describe the an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and list enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them can be repaired Describe the different methods of gene transfer and the importance of different vectors in recombinant DNA technology Assemble basic materials important in molecular techniques Demonstrate molecular techniques
Test 1	10%	Day 2												
Test 2	10 %	Day 5												
Test 3	10%	Day 7												
Final exam	50%	Day 13												
<p>Course Policy</p>	<p>Refer in this curriculum.(page)</p>													
<p>Reference (s)</p>	<p>Required texts:</p> <p>995. Darnel, Lodish, Baltimore. Molecular Cell Biology</p> <p>Recommended study books</p> <p>996. Robert F. weaver, Philip W. Hedrick. Genetics.</p> <p>997. James D. Watson: Recombinant DNA</p>													

	998. Robert F. Weaver. Molecular biology 999. Benjamin Lewin: Genes VI and above 1000. Richard J. Epistein: Human Molecular Biology 1001. P.K. Gupta: Cell and Molecular Biology
Approval Section	Name of Module Coordinator/Course team leader: _____ Signature _____ Date: _____ Name of School/Department head _____ Signature _____ Date: _____

• **Basic Molecular Biology**

Department	Department	Department	Department	
Course Title /Code	Course Title /Code	Basic Molecular Biology (M	Course Title /Code	Basic M
Program/Target Group	Program/Target Group	BSc Degree in Medical Labor Year: II Semester : II	Program/Target Group	BSc De Year: I
Module Title (Code)	Module Title (Code)	Immunology and Molecular B	Module Title (Code)	Immun
Module Coordinator	Module Coordinator	Name	Module Coordinator	Name
Course EtCTS	Course EtCTS	5 EtCTS	Course EtCTS	5 EtCT
Course Information	Course Information	Academic Year : Meeting Day _____ Meet	Course Information	Academ Meeting
Instructor's Name	Instructor's Name	_____	Instructor's Name	_____
Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____	Instructor's Contact Information	Office N Phone N E-mail Office I
EtCTS	EtCTS	5 CP/ 135 Hrs.	EtCTS	5 CP/ 1
Student Work Load	Student Work Load	Lecture Demonstr ation Tu	Student Work Load	Lectu

		48 Hrs.	6 Hrs.	6 Hrs.		48 Hrs.
Course Description	Course Description	The course describes concepts of DNA replication, transcription and translation in prokaryotes and eukaryotes. It also covers gene repair and transfer of genes. The course also covers gene extraction, gene cloning and gene expression. It clearly indicate its applications.			Course Description	The course describes concepts of DNA replication, transcription and translation in prokaryotes and eukaryotes. It also covers gene repair and transfer of genes. The course also covers gene extraction, gene cloning and gene expression. It clearly indicate its applications.
Course Objective	Course Objective	289. General Objectives The student will be able to: • Explain the process of gene replication and expression • Perform molecular techniques • Explain the causes of genetic diseases in modern times 290. Instructional Objectives At the end of the course, students should be able to: Knowledge <ul style="list-style-type: none"> Describe an overview of molecular biology Explain basic chemical structures of DNA, RNA and proteins Explain the mechanism of DNA replication, transcription and translation Explain the role of enzymes associated in genetic processes Explain causes of mutations Describe the different methods of gene transfer Describe the different types of vectors in recombinant DNA technology Skill <ul style="list-style-type: none"> Assemble basic molecular biology equipment Demonstrate molecular biology techniques Attitude <ul style="list-style-type: none"> Participate actively in discussions Take responsibility for learning Use your time effectively 			Course Objective	291. General Objectives The student will be able to: • Explain the process of gene replication and expression • Perform molecular techniques • Explain the causes of genetic diseases in modern times 292. Instructional Objectives At the end of the course, students should be able to: Knowledge <ul style="list-style-type: none"> Describe an overview of molecular biology Explain basic chemical structures of DNA, RNA and proteins Explain the mechanism of DNA replication, transcription and translation Explain the role of enzymes associated in genetic processes Explain causes of mutations Describe the different methods of gene transfer Describe the different types of vectors in recombinant DNA technology Skill <ul style="list-style-type: none"> Assemble basic molecular biology equipment Demonstrate molecular biology techniques Attitude <ul style="list-style-type: none"> Participate actively in discussions Take responsibility for learning Use your time effectively
Pre-requisite(s)	Pre-requisite(s)	Principle of genetics			Pre-requisite(s)	Principle of genetics

Course Status		Course Status		Core	Course Status		Core
Mode of Delivery		Mode of Delivery		Block	Mode of Delivery		Block
		Self-paced					
Day	Contact Hour	Day	Contact Hour	Topics and Sub Topics	Day	Contact Hour	Topics and Sub Topics
One	6	One	6 Hrs.	<u>Lecture</u> Chapter One: Introduction to Molecular Biology 1.721. Define the term molecular biology 1.722. Historical development of molecular biology 1.723. Overview of the central dogma of molecular biology Biologically important molecules 1.724. Cellular components 1.725. The central dogma of molecular biology	One	6 Hrs.	<u>Lecture</u> Chapter Two: DNA as the Genetic Material 290.1. Experimental evidence for DNA as the genetic material 290.2. DNA structure 290.3. DNA Replication 290.4. DNA Damage and Repair
	5		5 Hrs.	Independent study		5 Hrs.	Independent study
	1		1 Hrs	Assignment for reading		1 Hrs	Assignment for reading
Two	6	Two	6 Hr.	<u>Lecture</u> Chapter Three: RNA and Protein Synthesis 3.721. Types of RNA Transcription Elongation & Termination 3.722. Prokaryotic transcription 3.723. Eukaryotic transcription 3.724. Chromatin structure 3.725. Post-transcriptional modification polyadenylation	Two	6 Hr.	<u>Lecture</u> Chapter Four: Protein Synthesis 4.721. Translation 4.722. Initiation 4.723. Elongation 4.724. Termination 4.725. Post-translational modification
	1		1 Hrs.	Assessment		1 Hrs.	Assessment

				• Test one			
	4		4 Hrs.	Independent study		4 Hrs.	Ind
	1		1Hrs	Assignment for reading		1Hrs	Ass
Three	6	Three	6Hr.	Lecture Chapter Four: Genetic c 4.721. Translati 4.722. Genetic c 4.723. Protein S 4.724. Regulati 4.725. Post-tran	Three	6Hr.	Lec Cha
	4		4 Hrs.	Written Assignment one		4 Hrs.	Wri
	2		2 Hrs.	Independent study		2 Hrs.	Ind
Four	6	Four	6 Hrs.	Lecture Chapter Five: - Regulati 5.433. Strategie 5.434. Regulati 5.435. Regulati	Four	6 Hrs.	Lec Cha
	6		6 Hrs.	Independent study		6 Hrs.	Ind
	1		1 Hrs	Assignment for reading		1 Hrs	Ass
Five	6	Five	6 Hrs.	Lecture Chapter Six: - Mutation 6.721. Types of mut 6.722. Mutagenic ag 6.723. How mutatio 6.724. Repair of Mu 6.725. Mutant isolat Chapter Seven: Gene T Elements 7.289. Extra chromo 7.290. Gene Transfe	Five	6 Hrs.	Lec Cha Ch Ele
	1		1 Hrs.	Assessment		1 Hrs.	Ass

				• Test two			
	4		4 Hrs.	Independent study		4 Hrs.	Independent study
	1		1Hrs	Assignment for reading		1Hrs	Assignment for reading
Six	6	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular cloning 8.2017 Recombinant DNA technology 8.2018 Cloning and transformation 8.2019 Steps in cloning 8.2020 Gene cloning 8.2021 Gene Libraries	Six	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular cloning
	4		4 Hrs.	Assignment two written		4 Hrs.	Assignment two written
	2		2 Hrs.	Independent study		2 Hrs.	Independent study
Seven	6 Hrs.	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Continued 8.2022 Extraction of DNA 8.2023 Gel electrophoresis 8.2024 Southern, Northern and Western blotting 8.2025 In Situ Hybridization 8.2026 PCR	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Continued
	1 Hr.		1 Hrs.	Assessment • Test three		1 Hrs.	Assessment
	5 Hrs.		5 Hrs.	Independent study		5 Hrs.	Independent study
	1 Hr.		1 Hrs	Assignment for reading		1 Hrs	Assignment for reading
Eight		Eight	150 Hrs.	<u>Lecture</u> Chapter Eight Continued 8.2027 DNA Hybridization 8.2028 Sequencing 8.2029 RFLP and SNP 8.2030 Molecular markers	Eight	151 Hrs.	<u>Lecture</u> Chapter Eight Continued
	5		5 Hrs.	Independent study		5 Hrs.	Independent study

	1		1Hrs	Reading for assignment		1Hrs	Rea
Nine	6	Nine	6 Hrs.	Laboratory 9.1. Laboratory (Demonst	Nine	6 Hrs.	Lab 9.1.
	6		6 Hrs.	Independent study		6 Hrs.	Ind
Ten	6	Ten	6 Hrs.	Assessment <ul style="list-style-type: none">Group presentati	Ten	6 Hrs.	Ass
	6		6 Hrs.	Independent study		6 Hrs.	Ind
Eleven	6	Eleven	6Hrs	Tutorial	Eleven	6Hrs	Tut
	6		6 Hrs.	Independent study		6 Hrs.	Ind
Twelve	3 Hrs	Twelve	3 Hrs.	Assessment Final written examinatio	Twelve	3 Hrs.	Ass Fin
Teaching and Learning Methods <ul style="list-style-type: none">Lecture/ Classroom contactTutorialDemonstrationPresentation and group discussionComputer assisted instruction(animation)		Teaching and Learning Methods <ul style="list-style-type: none">Lecture/ Classroom contactTutorialDemonstrationPresentation and group discussionComputer assisted instruction(animation)			Teaching and Learning Methods <ul style="list-style-type: none">Lecture/ Classroom contactTutorialDemonstrationPresentation and group discussionComputer assisted instruction(animation)		
Assessment <ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)		Assessment <ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)		Type and Weight <ul style="list-style-type: none">Written Assignment. (15%) Discuss The of PCR variWritten Assignment. (10%) Group presentation	Assessment <ul style="list-style-type: none">Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)		

		Three Tests (30%) Test 1 10% Test 2 10 % Test 3 10% Final exam 50%	
Course Policy	Course Policy	Refer in this curricu	Course Policy
Reference (s)	Reference (s)	Required texts: 1009. Darne Recommended stu 1010. Rober 1011. James 1012. Rober 1013. Benja 1014. Richa 1015. P.K. C	Reference (s)
Approval Section	Approval Section	Name of Module C Signature _____	Approval Section

			Name of School/D			
			Signature _____			
Basic Molecular Biology	• Basic Molecular Biology					
Department	Department	Department of Medical Laboratory Science				
Course Title /Code	Course Title /Code	Basic Molecular Biology (MeLS2102)				
Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II				
Module Title (Code)	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)				
Module Coordinator	Module Coordinator	Name				
Course EtCTS	Course EtCTS	5 EtCTS				
Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location _____				
Instructor's Name	Instructor's Name	_____				
Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____				
EtCTS	EtCTS	5 CP/ 135 Hrs.				
Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment
		48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.
Course Description	Course Description	The course describes components and structures of the replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes repair and transfer of genes. Basic procedures used in molecular gene extraction, gene cloning, PCR and sequence analysis will				

				clearly indicate its application in medicine.
Course Objective		Course Objective		<p>295. General Objectives</p> <p>The student will be able to describe the central dogma of gene replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of genetic diseases in modern medicine.</p> <p>296. Instructional Objectives</p> <p>At the end of the course, students will be able to:</p> <p>Knowledge</p> <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them are inherited Describe the different methods of gene transfer and the importance of vectors in recombinant DNA technology <p>Skill</p> <ul style="list-style-type: none"> Assemble basic materials important in molecular techniques Demonstrate molecular techniques <p>Attitude</p> <ul style="list-style-type: none"> Participate actively in discussions and group work Take responsibility for individual work Use your time effectively for group and homework to complete assignments
Pre-requisite(s)		Pre-requisite(s)		Principle of genetics
Course Status		Course Status		Core
Mode of Delivery		Mode of Delivery		Block
		Schedule		
Day	Contact Hour	Day	Contact Hour	Topics and Sub Topics
One	6	One	6 Hrs.	<u>Lecture</u>

				Chapter One: Introduction 1.736. Define terms in molecular biology 1.737. Historical overview of molecular biology 1.738. Overview of cellular structure and function Biologically important molecule 1.739. Cellular genetic components 1.740. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 296.1. Experimental basis of DNA 296.2. DNA structure and function 296.3. DNA Replication and enzymes involved 296.4. Damage and Repair
		5		5 Hrs. Independent study
		1		1 Hrs Assignment for reading
	Two	6	Two	Lecture Chapter Three: RNA and primary Gene Expression 3.736. Types of RNA molecules & synthesis (Initiation Elongation & Termination mechanism) 3.737. Prokaryotic transcription 3.738. Eukaryotic transcription and transcription factors 3.739. Chromatin structure and eukaryotic transcription 3.740. Post-transcriptional events; RNA splicing; capping polyadenylation
		1		1 Hrs. Assessment <ul style="list-style-type: none"> Test one
		4		4 Hrs. Independent study
		1		1Hrs Assignment for reading
		6		Lecture Chapter Four: Genetic code and its translation 4.736. Translation: Prokaryotic Vs Eukaryotic
	Three		Three	

				4.737. Genetic code 4.738. Protein Structure related to function 4.739. Regulation of Translation 4.740. Post-translation Modification
		4	4 Hrs.	Written Assignment one
		2	2 Hrs.	Independent study
	Four	6	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.442. Strategies for controlling gene expression 5.443. Regulation of gene expression in Prokaryotes 5.444. Regulation of gene expression in eukaryotes
		6	6 Hrs.	Independent study
		1	1 Hrs	Assignment for reading
	Five	6	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.736. Types of mutation 6.737. Mutagenic agents 6.738. How mutation affects the genetic code? 6.739. Repair of Mutation 6.740. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.295. Extra chromosomal elements: plasmid, transposon 7.296. Gene Transfer: conjugation, transformation, transduction
		1	1 Hrs.	Assessment • Test two
		4	4 Hrs.	Independent study
		1	1Hrs	Assignment for reading
	Six	6	6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.2059 Recombinant DNA technology/genetic engineering

				8.2060 Cloning and Cloning vectors 8.2061 Steps in cloning 8.2062 Gene cloning tools (Plasmids, restriction enzymes) 8.2063 Gene Libraries
	4		4 Hrs.	Assignment two written
	2		2 Hrs.	Independent study
Seven	6 Hrs.	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.2064 Extraction of DNA,RNA from cells, 8.2065 Gel electrophoresis 8.2066 Southern, Northern, Western Blot 8.2067 In Situ Hybridization 8.2068 PCR
	1 Hr.		1 Hrs.	Assessment • Test three
	5 Hrs.		5 Hrs.	Independent study
	1 Hr.		1 Hrs.	Assignment for reading
Eight		Eight	153 Hr.	<u>Lecture</u> Chapter Eight Cont 8.2069 DNA Hybridization 8.2070 Sequencing 8.2071 RFLP and SNP 8.2072 Molecular markers
	5		5 Hrs.	Independent study
	1		1Hrs	Reading for assignment
Nine	6	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
	6		6 Hrs.	Independent study
Ten	6	Ten	6 Hrs.	Assessment • Group presentation
	6		6 Hrs.	Independent study

Eleven	6	Eleven	6Hrs	Tutorial													
	6		6 Hrs.	Independent study													
Twelve	3 Hrs	Twelve	3 Hrs.	Assessment													
				Final written examination													
Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)		Teaching and Learning Methods <ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)															
Assessment <ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final examination (50%)		Assessment <ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)		Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none">• Written Assignment 1. (5%) Discuss The different types of PCR variations.• Written Assignment 2 (10%) Group presentation (5%)		Competence to <ul style="list-style-type: none">• Describe the central dogma of biology• Explain basic concepts of DNA, RNA• Explain the processes of replication, translation and expression associated with DNA• Explain causes of mutations in the cell and how they can be repaired• Describe the importance of gene transfer technology• vectors in genetic engineering• Assemble and analyze DNA											
				Three Tests (30%) <table><tr><td>Test 1</td><td>10%</td><td>Day 2</td></tr><tr><td>Test 2</td><td>10 %</td><td>Day 5</td></tr><tr><td>Test 3</td><td>10%</td><td>Day 7</td></tr><tr><td>Final exam</td><td>50%</td><td>Day 13</td></tr></table>			Test 1	10%	Day 2	Test 2	10 %	Day 5	Test 3	10%	Day 7	Final exam	50%
Test 1	10%	Day 2															
Test 2	10 %	Day 5															
Test 3	10%	Day 7															
Final exam	50%	Day 13															

			<div>important i</div> <div>techniques</div> <div><div>• Demonstrat</div><div>techniques</div></div>
Course Policy	Course Policy	Refer in this curriculum.(page)	
Reference (s)	Reference (s)	<div>Required texts:</div> <div>1030. Darnel, Lodish, Baltimore. Molecular C</div> <div>Recommended study books</div> <div>1031. Robert F. weaver, Philip W. Hedrick. Ge</div> <div>1032. James D. Watson: Recombinant DNA</div> <div>1033. Robert F. Weaver. Molecular biology</div> <div>1034. Benjamin Lewin: Genes VI and above</div> <div>1035. Richard J. Epistein: Human Molecular E</div> <div>1036. P.K. Gupta: Cell and Molecular Biology</div>	
Approval Section	Approval Section	<div>Name of Module Coordinator/Course team leader: </div> <div>Signature Date:</div> <div>Name of School/Department head</div> <div>Signature Date:</div>	
Basic Molecular Biology	1. Basic Molecular Biology		

Department	Department	Department of Medical Laboratory Science					
Course Title /Code	Course Title /Code	Basic Molecular Biology (MeLS2102)					
Program/Target Group	Program/Target Group	BSc Degree in Medical Laboratory Sciences Year: II Semester : II					
Module Title (Code)	Module Title (Code)	Immunology and Molecular Biology (MeLSM2109)					
Module Coordinator	Module Coordinator	Name					
Course EtCTS	Course EtCTS	5 EtCTS					
Course Information	Course Information	Academic Year : Meeting Day _____ Meeting Time _____ Meeting Location _____					
Instructor's Name	Instructor's Name	_____					
Instructor's Contact Information	Instructor's Contact Information	Office No. _____ Phone No. _____ E-mail _____ Office Hour _____					
EtCTS	EtCTS	5 CP/ 135 Hrs.					
Student Work Load	Student Work Load	Lecture	Demonstration	Tutorial	Independent Study	Assignment	
		48 Hrs.	6 Hrs.	6 Hrs.	55 Hrs.	8 Hrs.	
Course Description	Course Description	The course describes components and structures of the replication, transcription and translation and enzymes involved in prokaryotes and eukaryotes. The course also describes repair and transfer of genes. Basic procedures used in molecular gene extraction, gene cloning, PCR and sequence analysis will clearly indicate its application in medicine.					
Course Objective	Course Objective	299. General Objectives The student will be able to describe the central dogma of gene replication and expressions both in prokaryotes and eukaryotes and perform molecular techniques in the diagnosis and treatment of diseases.					

		genetic diseases in modern medicine.	
		300. Instructional Objectives At the end of the course, students will be able to: Knowledge <ul style="list-style-type: none"> Describe an overview of central dogma of Molecular biology Explain basic chemical structure of DNA, RNA Explain the mechanisms of DNA replication, transcription and translation and the enzymes associated in gene replication and expression Explain causes of mutations in the cell and how some of them are inherited Describe the different methods of gene transfer and the importance of vectors in recombinant DNA technology Skill <ul style="list-style-type: none"> Assemble basic materials important in molecular techniques Demonstrate molecular techniques Attitude <ul style="list-style-type: none"> Participate actively in discussions and group work Take responsibility for individual work Use your time effectively for group and homework to complete assignments 	
Pre-requisite(s)		Pre-requisite(s)	
Course Status		Principle of genetics	
Mode of Delivery		Core	
		Block	
		Schedule	
Day	Contact Hour	Day	Contact Hour
One	6	One	6 Hrs.
		Topics and Sub Topics <u>Lecture</u> Chapter One: Introduction <ul style="list-style-type: none"> 1.746. Define terms in molecular biology 1.747. Historical overview of molecular biology 1.748. Overview of cellular structure and function Biologically important molecule	

				1.749. Cellular genetic components 1.750. The central dogma of molecular biology Chapter Two: DNA as Primary Genetic Material 300.1. Experimental basis of DNA 300.2. DNA structure and function 300.3. DNA Replication and enzymes involved 300.4. Damage and Repair
		5	5 Hrs.	Independent study
		1	1 Hrs	Assignment for reading
	Two	6	6 Hr.	<u>Lecture</u> Chapter Three: RNA and primary Gene Expression 3.746. Types of RNA molecules & synthesis (Initiation Elongation & Termination mechanism) 3.747. Prokaryotic transcription 3.748. Eukaryotic transcription and transcription factor 3.749. Chromatin structure and eukaryotic transcriptio 3.750. Post-transcriptional events; RNA splicing; capp polyadenylation
		1	1 Hrs.	Assessment • Test one
		4	4 Hrs.	Independent study
		1	1Hrs	Assignment for reading
	Three	6	6Hr.	<u>Lecture</u> Chapter Four: Genetic code and its translation 4.746. Translation: Prokaryotic Vs Eukaryotic 4.747. Genetic code 4.748. Protein Structure related to function 4.749. Regulation of Translation 4.750. Post-translation Modification
		4	4 Hrs.	Written Assignment one

	2		2 Hrs.	Independent study
Four	6	Four	6 Hrs.	<u>Lecture</u> Chapter Five: - Regulation of gene expression 5.448. Strategies for controlling gene expression 5.449. Regulation of gene expression in Prokaryote 5.450. Regulation of gene expression in eukaryote
	6		6 Hrs.	Independent study
	1		1 Hrs	Assignment for reading
Five	6	Five	6 Hrs.	<u>Lecture</u> Chapter Six: - Mutation 6.746. Types of mutation 6.747. Mutagenic agents 6.748. How mutation affects the genetic code? 6.749. Repair of Mutation 6.750. Mutant isolation and detection Chapter Seven: Gene Transfer and Transposable Genetic Elements 7.299. Extra chromosomal elements: plasmid, transposon 7.300. Gene Transfer: conjugation, transformation, transduction
	1		1 Hrs.	Assessment • Test two
	4		4 Hrs.	Independent study
Six	1	Six	1Hrs	Assignment for reading
	6		6 Hrs.	<u>Lecture</u> Chapter Eight: - Molecular Techniques 8.2087 Recombinant DNA technology/genetic engineering 8.2088 Cloning and Cloning vectors 8.2089 Steps in cloning 8.2090 Gene cloning tools (Plasmids, restriction enzymes) 8.2091 Gene Libraries
	4		4 Hrs.	Assignment two written

	2		2 Hrs.	Independent study
Seven	6 Hrs.	Seven	6 Hrs.	<u>Lecture</u> Chapter Eight Cont..... 8.2092 Extraction of DNA,RNA from cells, 8.2093 Gel electrophoresis 8.2094 Southern, Northern, Western Blot 8.2095 In Situ Hybridization 8.2096 PCR
	1 Hr.		1 Hrs.	Assessment <ul style="list-style-type: none"> • Test three
	5 Hrs.		5 Hrs.	Independent study
	1 Hr.		1 Hrs	Assignment for reading
Eight		Eight	155 Hr.	<u>Lecture</u> Chapter Eight Cont 8.2097 DNA Hybridization 8.2098 Sequencing 8.2099 RFLP and SNP 8.2100 Molecular markers
	5		5 Hrs.	Independent study
	1		1Hrs	Reading for assignment
Nine	6	Nine	6 Hrs.	<u>Laboratory</u> 9.1. Laboratory (Demonstration of Molecular Techniques)
	6		6 Hrs.	Independent study
Ten	6	Ten	6 Hrs.	Assessment <ul style="list-style-type: none"> • Group presentation
	6		6 Hrs.	Independent study
Eleven	6	Eleven	6Hrs	Tutorial
	6		6 Hrs.	Independent study
Twelve	3 Hrs	Twelve	3 Hrs.	Assessment Final written examination
Teaching and Learning Methods		Teaching and Learning Methods		

<ul style="list-style-type: none">• Lecture/ Classroom contact• Tutorial• Demonstration• Presentation and group discussion• Computer assisted instruction(animation)			
Assessment <ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Assessment <ul style="list-style-type: none">• Assessment in this course will be based on written assignments (15%), group presentation (5%), three continuous tests (30%) and final exam (50%)	Type and Weight (Percentage) Assignment. (15%) <ul style="list-style-type: none">• Written Assignment 1. (5%) Discuss The different types of PCR variations.• Written Assignment 2 (10%) Group presentation (5%)	Competence to <ul style="list-style-type: none">• Describe the central dogma of biology• Explain basic principles of DNA, RNA and protein synthesis• Explain the mechanisms of replication, transcription and translation associated with gene expression• Explain causes of mutations in the cell and how they can be repaired• Describe the importance of gene transfer and its importance in biotechnology• Assemble and analyze important biological techniques• Demonstrate laboratory techniques
Course Policy	Course Policy	Refer in this curriculum.(page)	

Reference (s)	Reference (s)	<p>Required texts:</p> <p>1044. Darnel, Lodish, Baltimore. Molecular C</p> <p>Recommended study books</p> <p>1045. Robert F. weaver, Philip W. Hedrick. Ge</p> <p>1046. James D. Watson: Recombinant DNA</p> <p>1047. Robert F. Weaver. Molecular biology</p> <p>1048. Benjamin Lewin: Genes VI and above</p> <p>1049. Richard J. Epistein: Human Molecular E</p> <p>1050. P.K. Gupta: Cell and Molecular Biology</p>
Approval Section	Approval Section	<p>Name of Module Coordinator/Course team leader: _____</p> <p>Signature _____ Date: _____</p> <p>Name of School/Department head _____</p> <p>Signature _____ Date: _____</p>