UNDERGRADUATE PROGRAMS

ALLIED HEALTH SCIENCES CURRICULA 2024

DEPARTMENT OF MEDICAL EDUCATION

University of Health Sciences, Lahore

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UHS/DME-25/960

Date: 11-03-2025

Pro Vice Chancellor
University of Health Sciences
Lahore.

Subject: Submission of semester-based curricula of Undergraduate Allied Health Sciences Degree Problem

The curricula of following Allied Health Sciences undergraduate programs have been developed by the subject advisory committee (SAC). The curriculum is prepared and reviewed by the experts of Subject advisory committee and is ready for uploading on official website.

Convener SAC	Degree Program	Signature
Brig (R) Tariq Mirza Mahmud	BS Medical Imaging Technology	
Prof. Dr. Asim Mumtaz	BS Medical Laboratory Technology	
Prof. Dr. Muhammad Moeen	BS Optometry & Orthoptics	
Prof. Dr. Nabila Talat	BS Operational Theater Technology	
Prof. Dr. Shazia Maqbool	BS Speech and Language Pathology	
Prof. Dr. Syed Asadullah Arslan	Doctor of Physical Therapy	
Prof. Dr. Saira Khalid	BS Dental Technology	
Dr. Shazia Zahra	BS Nutrition	

Dr. Saba Khaliq
Director, Institute of Allied Health Science
University of Health Sciences, Lahore

Prof. Dr. Sumera Ehsan
Head Department of Medical Education
University of Health Sciences, Lahore

Semester 3 & 4

GENERAL EDUCATION COURSES

APPLICATIONS OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

Credit Hours: 03 (2+1)

Learning Outcomes/Objectives:

1. Explain the fundamental concepts, components, and scope of Information and Communication Technologies (JCT).
2. Identify uses of various ICT platforms and tools for different purposes.
3. Apply ICT platforms and tools for different purposes to address basic needs in different domains of daily, academic, and professional life.
4. Understand the ethical and legal considerations in use of ICT platforms and tools.

Course Content	MCQs	SEQs
I. Introduction to Information and Communication Technologies: i. Components of Information and Communication Technologies (basics of hardware. software, ICT platforms, networks, local and cloud data storage etc.). ii. Scope of Information and Communication Technologies (use of ICT in education. business, governance, healthcare, digital media and entertainment, etc.). iii. Emerging technologies and future trends.	05	01
II. Basic ICT Productivity Tools: i. Effective use of popular search engines (e.g., Google, Bing, etc.) to explore World Wide Web. ii. Formal communication tools and etiquettes (Gmail, Microsoft Outlook, etc.). iii. Microsoft Office Suites (Word, Excel, PowerPoint). iv. Google Workspace (Google Docs, Sheets, Slides). v. Dropbox (Cloud storage and file sharing), Google Drive (Cloud storage with Google Docs integration) and Microsoft OneDrive (Cloud storage with Microsoft Office integration). vi. Evernote (Note-taking and organization applications) and OneNote (Microsoft's digital notebook for capturing and organizing ideas). vii. Video conferencing (Google Meet, Microsoft Teams, Zoom, etc.). viii. Social media applications (LinkedIn, Facebook, Instagram, etc.).	10	02
III. ICT in Education: i. Working with learning management systems (Moodle, Canvas, Google Classrooms, etc.). ii. Sources of online education courses (Coursera, edX, Udemy, Khan Academy, etc.). iii. Interactive multimedia and virtual classrooms. **IV. ICT in Health and Well-being:** i. Health and fitness tracking devices and applications (Google Fit,	05	01

Samsung Health, Apple Health, Xiaomi Mi Band, Run keeper, etc.). ii. Telemedicine and on-line health consultations (OLADOC, Sehat Kahani, Marham, etc.).		
V. ICT in Personal Finance and Shopping: i. Online banking and financial management tools (jazz Cash, Easypaisa, Zong, Pay May, 1LINK and MNET, Keenu Wallet, etc.). ii. E-commerce platforms (Daraz.pk, Telemart, Shophive, etc.) **VI. Digital Citizenship and Online Etiquette:** i. Digital identity and online reputation. ii. Netiquette and respectful online communication. iii. Cyberbullying and online harassment.	05	01
VII. Ethical Considerations in Use of ICT Platforms and Tools: i. Intellectual property and copyright issues. ii. Ensuring originality in content creation by avoiding plagiarism and unauthorized use of information sources. iii. Content accuracy and integrity (ensuring that the content shared through ICT platforms is free from misinformation, fake news, and manipulation).	05	01

Practical Requirements	OSPE
As part of the overall learning requirements, the course will include: I. Guided tutorials and exercises to ensure that students are proficient in commonly used software applications such as word processing software (e.g., Microsoft Word), presentation software (e.g., Microsoft PowerPoint), spreadsheet software (e.g., Microsoft Excel) among such other tools. Students may be assigned practical tasks that require them to create documents, presentations, and spreadsheets etc. II. Assigning of tasks that involve creating, managing, and organizing files and folders on both local and cloud storage systems. Students will practice file naming conventions, creating directories, and using cloud storage solutions (e.g., Google Drive, OneDrive). III. The use of online learning management systems (LMS) where students can access course materials, submit assignments, participate in discussion forums, and take quizzes or tests. This will provide students with the practical experience with online platforms commonly used in education and the workplace.	03

Suggested Instructional/ Reading Materials

1. Discovering Computers" by Vermaat, Shaffer, and Freund.
2. “GO! with Microsoft Office" Series by Gaskin, Vargas, and McLellan.
3. “Exploring Microsoft Office" Series by Grauer and Poatsy.
4. “Computing Essentials" by Morley and Parker.
5. “Technology in Action” by Evans, Martin, and Poatsy.

ENTERPRENUERSHIP

Credit Hours: 02 (2+0)

Learning Outcomes/Objectives:

By the end of the course, student shall have:

1. Knowledge of fundamental entrepreneurial 2 concepts, skills and process.
2. Understanding on different personal, social and financial aspects associated with entrepreneurial activities.
3. Basic understanding of regulatory requirements to set up an enterprise in Pakistan, with special emphasis on export businesses.
4. Ability to apply knowledge, skills and competencies acquired in the course to develop a feasible business plan.

Course Content	MCQs	SEQs
I. Introduction to Entrepreneurship: i. Definition and concept of entrepreneurship. ii. Why to become an entrepreneur? iii. Entrepreneurial process. iv. Role of entrepreneurship in economic development.	05	01
II. Entrepreneurial Skills: i. Characteristics and qualities of successful entrepreneurs (including stories of successes and failures). ii. Areas of essential entrepreneurial skill and ability such as creative and critical thinking. innovation and risk-taking abilities etc.	05	01
III. Opportunity Recognition and Idea Generation: i. Opportunity identification, evaluation and exploitation, ii. Innovative idea generation techniques for entrepreneurial ventures. **IV. Marketing and Sales** i. Target market identification and segmentation; ii. Four P's of Marketing iii. Developing a marketing strategy. iv. Branding	05	01
V. Financial Literacy i. Basic concepts of income, savings and investments ii. Basic concepts of anets, liabilities and equity iii. Basics of reverse and expenses iv. Overview of cash-flows v. Overview of banking products including Islamic modes of financing vi. Sources of funding for startups (angel financing, debt financing, equity financing etc.)	05	01
VI. Team Building for Startups: i. Characteristics and features of effective teams	05	01

ii. Team building and effective leadership for startups		
VII. Regulatory Requirements to Establish Enterprises in Pakistan: i. Types of enterprises (eg, sole proprietorship, partnerships private limited companies etc.). ii. Intellectual property rights and protection iii. Regulatory requirements to register an enterprise in Pakistan, with special emphasis on sport firms iv. Taxation and financial reporting obligation	05	01

Suggested Instructional/ Reading Materials:

1. "Entrepreneurship: Successfully Launching New Ventures" by Bruce R. Barringer and R. Duane Ireland.
2. "Entrepreneurship: Theory, Process, and Practice" by Donald F. Kuratko.
3. "New Venture Creation: Entrepreneurship for the 21st Century" by Jeffry A. Timmons, Stephen Spinelli Jr., and Rob Adams.
4. "Entrepreneurship: A Real-World Approach" by Rhonda Abrams.
5. "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries.
6. "Effectual Entrepreneurship" by Stuart Read, Saras Sarasvathy, Nick Dew, Robert Wiltbank, and Anne-Valérie Ohlsson.

CIVICS AND COMMUNITY ENGAGEMENT

Credit Hours: 02 (2+0)

Learning Outcomes/Objectives:

By the end of the course, student shall have:

1. Demonstrate fundamental understanding of civics, government, citizenship and civil society.
2. Understand the concept of community and recognize the significance of community engagement for individuals and groups.
3. Recognize the importance of diversity and inclusivity for societal harmony and peaceful co-existence.

Course Content	MCQs	SEQs
I. Civics and Citizenship: i. Concepts of civics, citizenship, and civic engagement. ii. Foundations of modern society and citizenship. iii. Types of citizenship: active, participatory, digital, etc **II. State, Government and Civil Society:** i. Structure and functions of government in Pakistan. ii. The relationship between democracy and civil society. iii. Right to vote and importance of political participation and representation.	05	01
III. Rights and Responsibilities: i. Overview of fundamental rights and liberties of citizens under Constitution of Pakistan 1973. ii. Civic responsibilities and duties. iii. Ethical considerations in civic engagement (accountability, non-violence, peaceful dialogue, civility, etc.)	05	01
IV. Community Engagement: i. Concept, nature and characteristics of community. ii. Community development and social cohesion. iii. Approaches to effective community engagement. iv. Case studies of successful community driven initiatives.	05	01
V. Advocacy and Activism: i. Public discourse and public opinion. ii. Role of advocacy in addressing social issues. iii. Social action movements.	05	01
VI. Digital Citizenship and Technology: i. The use of digital platforms for civic engagement. ii. Cyber ethics and responsible use of social media. iii. Digital divides and disparities (access, usage, socioeconomic, geographic, etc.) and their impacts on citizenship.	05	01
VII. Diversity, Inclusion and Social Justice:	05	01

i. Understanding diversity in society (ethnic, cultural, economic, political etc.). ii. Youth, women and minorities' engagement in social development. iii. Addressing social inequalities and injustices in Pakistan. iv. Promoting inclusive citizenship and equal rights for societal harmony and peaceful co-existence.		

Suggested Instructional / Reading Materials

1. "Civics Today: Citizenship, Economics, & You" by McGraw-Hill Education.
2. "Citizenship in Diverse Societies" by Will Kymlicka and Wayne Norman.
3. "Engaging Youth in Civic Life" by James Youniss and Peter Levine.
4. "Digital Citizenship in Action: Empowering Students to Engage in Online Communities" by Kristen Mattson.
5. "Globalization and Citizenship: In the Pursuit of a Cosmopolitan Education" by Graham Pike and David Selby.
6. "Community Engagement: Principles, Strategies, and Practices" by Becky J. Feldpausch and Susan M. Omilian.
7. "Creating Social Change: A Blueprint for a Better World" by Matthew Clarke and Marie-Monique Steckel

PAKISTAN STUDIES

Credit Hours: 02 (2+0)

Description

This course is designed to provide students with a comprehensive exploration of Pakistan's identity, Spanning geographical, historical, and cultural dimensions. It delves into the diverse landscapes, ancient civilizations, and rich cultural heritage that define Pakistan. Moreover, it examines the socio-cultural and political transformations in Pakistan over time including democratic transitions and military interventions. The aim of this course is to inculcate in students a nuanced understanding of Pakistan's past, present, and potential future trajectories, enabling them to critically evaluate the complex dynamics shaping the nation's development

Learning Outcomes/Objectives:

By the end of this course, students will be able to:

1. Have enhanced knowledge of the geographical, historical, and political aspects of Pakistan.
2. Understand the society and culture of Pakistan.
3. Understand and explain the socio-economic developments in Pakistan.
4. Explore contemporary issues and challenges and their implications for Pakistan

Course Content	MCQs	SEQs
1. Introduction to Pakistan: • Geographical location and significance. • Historical background: Ancient civilizations in the region. • Factors leading to the creation of Pakistan.	05	01
2. Political History of Pakistan • Formative phase. • Military interventions and democratic transitions.	05	01
3. Geography of Pakistan: • Physiographic: Mountains, plains, plateaus, deserts, valleys and coastal areas. • River systems: Indus River and its tributaries. • Climatic regions of Pakistan.	05	01
4. Society and Culture of Pakistan: • Socio-cultural diversity. • Languages and literature of Pakistan.	05	01
5. Economic Development of Pakistan: • Agricultural and industrial sectors of Pakistan. • Economic challenges of Pakistan.	05	01

6. Contemporary Issues: • Foreign Relations of Pakistan. • Security Challenges: Terrorism, extremism, and regional conflicts. • Environmental problems and sustainable development (SDGs). • Media and Social Change	05	01

Suggested Instructional / Reading Materials

1. The struggle for Pakistan by Ishtiaq Husain Qureshi.
2. Pakistan, the Formative Phase, 1557- 1945" by Khalid B. Sayeed.
3. Constitutional and Political History of Pakistan" by Hamid Khan.
4. Trek to Pakistan" by Ahmad Saeed and Kh. Mansur Sarwar.2019. Peace Publication.
5. Pakistan: The Modern History" by Ian Talbot. 2001
6. Politics in Pakistan: The Nature and Direction of Change" by Khalid B. Sayeed.
7. Rumi, R. (2018). Being Pakistani: Society, culture and the arts. Harper Collins.
8. "Pakistan the Formative Phase" by Khalid Bin Sayeed, 2nd Edition, Oxford University Press, 1991.
9. “Language and Politics in Pakistan” by Tariq Rahman
10. “Sociology” by Horton and Hunt

INTER-DISCIPLINARY COURSES

GENERAL PATHOLOGY

CREDIT HOURS 03 (3+0)

Learning Outcomes/Objectives:

The students will able to:

1. To understand the basic terminologies in different pathological states
2. To elaborate the cell injuries, necrosis, their types and practical applications of pathology

Course Content	MCQs	SEQs
I. Cellular Responses to Stress and Toxic Insults i. Adaptation (Hyperplasia, Atypia, Hypertrophy, Metaplasia) ii. Cell Injury (causes, morphological alterations and mechanisms of Reversible/Irreversible cell injury) iii. Cell Death (Necrosis, Apoptosis) iv. Intracellular Accumulations and Pathological calcification	05	1.5
II. Inflammation and Repair i. Acute Inflammation ii. Chronic inflammation iii. Tissue repair	08	02
III. Hemodynamic Disorders, Thromboembolic Disease, and Shock i. Hyperemia and Congestion ii. Hemostasis, Hemorrhagic Disorders, and Thrombosis iii. Embolism iv. Infarction v. Shock	05	01
IV. Diseases of the Immune System i. Normal immune response ii. Hypersensitivity	05	01
V. Neoplasia i. Nomenclature ii. Characteristics of benign and malignant neoplasms iii. Clinical aspects of neoplasia iv. Diagnosis and treatment of Cancer in general, fate, survival and prognosis with tumors	08	02
VI. Infectious Diseases i. General Principles of Microbial Pathogenesis	04	0.5
VII. Environmental and Nutritional Diseases i. Injury by physical agents (mechanical trauma, thermal injury, electrical injury, radiation injury) ii. Nutritional diseases	05	0.5
VIII. Miscellaneous topics i. Anemia ii. Fever	05	0.5

iii.	Hypertension iv. Diarrhea v. Peptic & duodenal ulcer		

Recommended Books/ Reading Materials

1. Oxford Handbook of Clinical Pathology (Oxford Medical Handbooks) 2nd Edition by James Carton.
2. Robbins & Cotran Pathologic Basis of Disease by .Vinay Kumar, Abul K. Abbas, Jon C Aster, 10th Edition.

ENGLISH PROFICIENCY COURSES

SEMESTER 3
English Proficiency Course 1 (EPC1)
Credit Hours 2 (2+0)

LEARNING OUTCOMES:

After the completion of this course, the learners will be able:

- To enhance and incorporate new lexical/vocabulary items.
- To reinvigorate the grammar and tense structure
- To read and comprehend with appropriate speed and adequate understanding utilizing different techniques
- To distinguish between the different context-based (social /educational) scenarios
- To learn effective interpersonal skills in formal and informal settings
- To express themselves with acceptable accuracy
- To activate and reinforce the abilities to understand the explicit and implicit texts

COURSE CONTENTS:

MODULES	WEEKS	TOPICS	REFERENCE MATERIALS

1A: READING	**Week 01**	**READING (THEORY)**
		• Silent and Aloud Reading
		• Active Reader and Passive Reader
		• Comprehension
		• Literal/ Lexical Comprehension
		• Add new/ difficult words in the Vocabulary Book
		  ○ Which parts of speech does the word belong to?
		  ○ Using them in sentences of their own
			• Beyond Decoding: The Behavioral and Biological Foundations of Reading Comprehension Edited by Richard K. Wagner, Christopher Schatschneider and Caroline Phythian-Sence
			• IELTS The Complete Guide to Academic Reading by Phil Biggerton.
			• 501 Reading Comprehension Questions 4th Edition.
			• Comprehension That Works by Danny Brassell & Timothy Rasinski.
			• Tips for IELTS Reading Academic / General Training Module By Adam Smith

	Week 02	**READING (PRACTICE TESTS)**	**Worksheets** **British Council Skills:** • Reading B1- Robot teachers • Reading B1- Social media influencers • Reading B1- The legend of fairies • Reading B1- Digital habits across generations • Reading B2- Work–life balance • Reading B2- Cultural expectations and leadership
2A: WRITING	**Week 03**	**WRITING (THEORY)** • Tenses • Subject/Verb Agreement • General Vocabulary • Topic Specific Vocabulary	• Collins- Grammar for IELTS By Fiona Aish & Jo Tomlinson • Grammar, Usage, and Mechanics by Holt, Rinehart and Winston • 101 Helpful Hints for IELTS by Garry Adams and Terry Peck • Check your Vocabulary for English for the IELTS Examination By Rawdon Wyatt • IELTS The Vocabulary Files by Andrew Betis and Sean Haughton
	Week 04	**WRITING (PRACTICE TESTS)**	**Worksheets** • Cambridge IELTS 11 (General Training) Writing Test 1: Task 1 & 2, Test 2: Task 1 & 2, Test 3: Task 1 & 2, Test 4: Task 1 & 2 • Cambridge IELTS 12 (General Training) Writing Test 5: Task 1 & 2, Test 6: Task 1 & 2, Test 7: Task 1 & 2, Test 8: Task 1 & 2
3A: LISTENING	**Week 05**	**LISTENING (THEORY)** • Active / Passive Listening • Focused/Attentive Listening • Multi-tasking ○ Listening Sample Audios (Monologue and Conversational)	• Erik Palmer - Teaching the Core Skills of Listening and Speaking-Association for Supervision & Curriculum Development (2013) • Nixsali Leonardo, LCSW - Active Listening Techniques 30 Practical Tools to Hone Your Communication Skills (2020)

		• Add new/ difficult words heard from the Audio clips in the Vocabulary Book
		  ○ Which parts of speech does the word belong to?
		  ○ Using them in sentences of their own
			• IELTS Listening Strategies for success, Academic and General by Matt McGinnies and Matt Cudmore
			• IELTS Vocabulary For Bands 6.5 and above By Pauline Cullen

	Week 06	**LISTENING (PRACTICE TESTS)** ○ At English Language Lab	**Audio +Worksheets** **British Council Skills:** • Listening A1: Finding the Library • Listening A1: Shopping for Clothes • Listening A2: Understanding an Explanation • Listening A2: Transport Announcements • Listening B1: A Phone Call from a customer • Listening B1: A Student Discussion • Listening B2: A Business Interview • Listening B2: A Design Presentation

4A: SPEAKING	**Week 07**	**SPEAKING (THEORY)**
		• Public Speaking (Social setting)
		  ○ Explanation
		  ○ Rules
		  ○ Employ everyday phrases.
		  ○ Social cues
		  ○ Sample Prompts
		  ○ Employ correct sentence/ grammatical structure in conversations
		  ○ Sample Prompts/ Topics
		• Lexical resource (Social Setting/ Topics)
		  ○ Use appropriate and high vocabulary
			• Public Speaking Principles and Practice by Irvah Lester Winter, Chapter 1
			• Oral Communication: Skills, Choices, and Consequences, 4th Edition by Kathryn Sue Young, Howard Paul Travis
			• Collins- Grammar for IELTS By Fiona Aish & Jo Tomlinson
			• Grammar, Usage, and Mechanics By Holt, Rinehart and Winston
			• Check your Vocabulary for English for the IELTS Examination By Rawdon Wyatt
			• IELTS The Vocabulary Files By Andrew Betis and Sean Haughton

		SPEAKING (PRACTICE TESTS)	**Tests** • IELTS Maximiser Educational Book Speaking ○ General (Questions)

	Week 08	○ At English Language Lab	○ Daily routines (Questions) • Cambridge IELTS 11 (General Training) Speaking Test 1-4 • Cambridge IELTS 12 (General Training) Speaking Test 1-4
MIDTERM EXAMINATION			
1B: READING	**Week 09**	**READING (THEORY)** • Reorganizational Comprehension • Scanning and Skimming ○ Explanation ○ Techniques and strategies • Add new/ difficult words in the Vocabulary Book ○ Which parts of speech does the word belong to? ○ Using them in sentences of their own	• 501 Reading Comprehension Questions 4th Edition • Cambridge Objective IELTS By Michael Black & Wendy Sharp • IELTS The Complete Guide to Academic Reading By Phil Biggerton • Beyond Decoding: The Behavioral and Biological Foundations of Reading Comprehension Edited by Richard K. Wagner, Christopher Schatschneider and Caroline Phythian-Sence
	Week 10	**READING (PRACTICE TESTS)**	**Worksheets** • Cambridge IELTS 11 (General Training) Reading Test 1-4 • Cambridge IELTS 12 (General Training) Reading Test 1-4
2B: WRITING	**Week 11**	**WRITING (THEORY)** • Brainstorming (Mind maps, Spider gram) • Paragraph formation ○ Topic sentence ○ Supporting sentence ○ Concluding sentence • Coherence and Cohesion	• The Easy Writer: Formal Writing for Academic Purposes 3rd Edition by Winifred Belmont and Michael Sharkey • Linking Words by Sylvia Chalker • Task 2 IELTS Writing By Adam Smith • IELTS on Track by Stephen Slater, Donna Millen, Pat Tyrie • Barron's IELTS 4th Edition

	Week 12	**WRITING (PRACTICE TESTS)**	**Worksheets** • Cambridge IELTS 13 (General Training) Writing Test 1: Task 1 & 2, Test 2: Task 1 & 2, Test 3: Task 1 & 2, Test 4: Task 1 & 2 • Cambridge IELTS 14 (General Training) Writing Test 1: Task 1 & 2, Test 2: Task 1 & 2, Test 3: Task 1 & 2, Test 4: Task 1 & 2

3B: LISTENING	**Week 13**	**LISTENING (THEORY)**
		• Contextual Listening (Social and Educational Context)
		  ○ Explanation
		  ○ Detect/Predict the tones, subtext, language and common phrases employed in audios of social and academic settings
		  ○ Listening sample audios (Monologue and Conversational)
		• Add new/ difficult words heard from the Audio clips in the Vocabulary Book
		  ○ Which parts of speech does the word belong to?
		  ○ Using them in sentences of their own
			• IELTS Vocabulary For Bands 6.5 and above By Pauline Cullen
			• IELTS Listening Strategies for success, Academic and General by Matt McGinnies and Matt Cudmore

	Week 14	**LISTENING (PRACTICE TESTS)** ○ At English Language Lab	**Audio +Worksheets** **British Council Skills:** • Listening A1: Ordering in a cafe • Listening A1: Meeting other students • Listening A2: Missing a class • Listening A2: Facts and Figures • Listening B1: A Team Meeting About Diversity • Listening B1: A Weather Forecast • Listening B2: A Lecture about an Experiment • Listening B2: A Digital Detox Podcast

4B: SPEAKING	**Week 15**	**SPEAKING (THEORY)**
		• Public Speaking (Formal Setting)
		  ○ Explanation
		  ○ Rules
		  ○ Formal Cues
		  ○ Avoidance of Slangs
		  ○ Sample Prompts
		• Lexical resource (Formal Setting/ Topics)
		  ○ Use appropriate and high vocabulary
			• Interpersonal Communication Concepts, Skills, and Context by Kathleen S Verderber & Erina L MacGeorge
			• Check your Vocabulary for English for the IELTS Examination By Rawdon Wyatt
			• IELTS The Vocabulary Files By Andrew Betis and Sean Haughton
			• Oral Communication: Skills, Choices, and Consequences, 4th Edition by Kathryn Sue Young, Howard Paul Travis

	Week 16	**SPEAKING (PRACTICE TESTS)**
		  ○ At English Language Lab
			Tests
			• IELTS Maximiser Educational Book Speaking
			  ○ Family (Questions)
			  ○ Friends (Questions)
			  ○ Home (Questions)
			• Cambridge IELTS 13 (General Training) Speaking Test 1-4
			• Cambridge IELTS 14 (General Training) Speaking Test 1-4

FINAL TERM EXAMINATION			

SEMESTER 4
English Proficiency Course 2 (EPC2)
Credit Hours 2(2+0)

LEARNING OUTCOMES:

After the completion of this course, the learners will be able:

- To develop an adequate understanding of analyzing the comprehension with speed reading.
- To maintain coherence while doing different tasks of Reading, Writing, Listening and Speaking
- To participate in group discussions for improving and expanding their knowledge in order to reinforce speaking and writing abilities
- To write the descriptions of various topics to validate writing skills
- To learn effective writing skills for formal and informal matters
- To extract main ideas for visual representation and vice versa.
- To identify and differentiate between facts and opinions
- To progressively enhance the confidence and overall performance
- To improve or enhance the vocabulary by incorporating new words

COURSE CONTENTS:

MODULE	WEEKS	TOPICS	REFERENCE MATERIALS

1A: READING	**Week 01**	**READING (THEORY)**
		• Fact and Opinion-Based Comprehension
		  ○ Explanation
		  ○ Sample Texts
		• Inferential Comprehension
		  ○ Explanation
		  ○ Sample Texts
		• Add new/ difficult words in the Vocabulary Book
		  ○ Which parts of speech does the word belong to?
			• Beyond Decoding: The Behavioral and Biological Foundations of Reading Comprehension Edited by Richard K. Wagner, Christopher Schatschneider and Caroline Phythian-Sence
			• IELTS: The Complete Guide to Academic Reading by Phil Biggerton.
			• Comprehension That Works By Danny Brassell & Timothy Rasinski

		○ Using them in sentences of their own	• English Reading Comprehension By Piyaporn Punkasiriku
	Week 02	**READING (PRACTICE TESTS)**	**Worksheets** **British Council Skills:** • Reading C1- How humans evolved language • Reading C1- Life on Mars • Reading C1- Sustainable supermarkets
2A: WRITING	**Week 03**	**WRITING (THEORY)** • Informal and Formal writing • Opinion Based Writing ○ Explanation ○ Formation ○ Sample Passages and Prompts	• The Easy Writer: Formal Writing for Academic Purposes 3rd Edition by Winifred Belmont and Michael Sharkey • 101 Helpful Hints for IELTS by Garry Adams and Terry Peck • The Oxford Essential Guide to Writing by Thomas S Kane
	Week 04	**WRITING (PRACTICE TESTS)**	**Worksheets** • Cambridge IELTS 15 (General Training) Writing Test 1: Task 1 & 2, Test 2: Task 1 & 2, Test 3: Task 1 & 2, Test 4: Task 1 & 2 • Cambridge IELTS 16 (General Training) Writing Test 1: Task 1 & 2, Test 2: Task 1 & 2, Test 3: Task 1 & 2, Test 4: Task 1 & 2
3A: LISTENING	**Week 05**	**LISTENING (THEORY)** • Literal Listening ○ Explanation ○ Comprehension of spoken words/numbers (Pronunciation) • Comprehensive Listening & Informational Listening ○ Explanation ○ Main message of the conversation ○ Organization of content • Add new/ difficult words heard from the Audio clips in the Vocabulary Book	• IELTS Listening Strategies for Success • IELTS Series, Volume 2 • Matt McGinniss and Matt Cudmore • IELTS Vocabulary For Bands 6.5 and above By Pauline Cullen

		○ Which parts of speech does the word belong to? ○ Using them in sentences of their own	
	Week 06	**LISTENING (PRACTICE TESTS)** ○ At English Language Lab	**Audio + Worksheets** **British Council Skills:** • Listening B1: An Interview about Listening Skills • Listening B1: Arriving late to class • Listening B2: A Talk about Motivation • Listening B2: Creating a Study Group
4A: SPEAKING	**Week 07**	**SPEAKING (THEORY)** • Clarity and Conciseness ○ Explanation ○ Clear idea or explanation of the topic ○ Filtering unnecessary details ○ Relevant explanation of the topic ○ Sample Prompts/ topics • Coherence ○ Explanation ○ Order of thoughts ○ Avoid stream-of-consciousness ○ Sample Prompts/ Topics	• Barron's IELTS 4th edition • Oral Communication: Skills, Choices, and Consequences, 4th Edition by Kathryn Sue Young, Howard Paul Travis
	Week 08	**SPEAKING (PRACTICE TESTS)** ○ At English Language Lab	**Tests** • IELTS Maximiser Educational Book Speaking ○ Neighbourhood (Questions) ○ Holiday (Questions) ○ Hobbies, like and dislikes (Questions) • Cambridge IELTS 15 (General Training) Speaking Test 1-4 • Cambridge IELTS 16 (General Training)Speaking Test 1-4
MIDTERM EXAMINATION			

1B: READING	**Week 09**	**READING (THEORY)**
		• Visual Summary
		  ○ Extracting main details from the passage to create/ fill a table, flowchart, and diagram
		• Add new/ difficult words in the Vocabulary Book
		  ○ Which parts of speech does the word belong to?
		  ○ Using them in sentences of their own
			• Tips for IELTS Reading- Academic/ General Training Module By Adam Smith
			• Beyond Decoding: The Behavioral and Biological Foundations of Reading Comprehension Edited by Richard K. Wagner, Christopher Schatschneider and Caroline Phythian-Sence
			• IELTS: The Complete Guide to Academic Reading by Phil Biggerton.

	Week 10	**READING (PRACTICE TESTS)**	**Worksheets** • Cambridge IELTS 13 (General Training) Reading Test 4 • Cambridge IELTS 14 (General Training) Reading Test 3 • Kaplan Test Prep IELTS Reading Chapter 4 Tests • Barron's IELTS 4th edition Academic Model Reading Test 3

2B: WRITING	**Week 11**	**WRITING (THEORY)**
		• Descriptive Writing (Prompts and Images)
		  ○ Explanation
		  ○ Sample Passages and Prompts
		  ○ Summary or description of a graph, table, or an image
		  ○ Rules
			• The Oxford Essential Guide to Writing by Thoma S Kane
			• IELTS Success: The Ultimate Guide to Score 7+ by Musitrature
			• Cambridge- Insights into IELTS by Vanessa Jakeman and Clare Mcdowell

	Week 12	**WRITING (PRACTICE TESTS)**	**Worksheets** • Barron's IELTS 4th edition Academic Model Writing Test 1-4 • Kaplan Test Prep IELTS Writing Chapter 1-4 Tests
3B: LISTENING	**Week 13**	**LISTENING (THEORY)** • Selective Listening ○ Explanation	• IELTS Series, Volume 2 • Matt McGinniss and Matt Cudmore

		○ Gathering/Remembering the relevant or main points from audio ○ Filtering extra information from required one ○ Strategies ○ Barriers ○ Sample audios (Monologues and Conversational) • Add new/ difficult words heard from the Audio clips in the Vocabulary Book ○ Which parts of speech does the word belong to? ○ Using them in sentences of their own	• IELTS Vocabulary For Bands 6.5 and above By Pauline Cullen • IELTS Listening Strategies for Success
	Week 14	**LISTENING (PRACTICE TESTS)** ○ At English Language Lab	**Audio +Worksheets** **British Council Skills:** • Listening B1: At the Chemist • Listening B1: Making a Decision • Listening B2: Getting Advise • Listening B2: Joining a Gym
4B: SPEAKING	**Week 15**	**SPEAKING (THEORY)** • Explanation/ Discussions ○ Skills and Strategies ○ Individual Explanation ○ Group discussion ○ Concept of Turn-Taking ○ Avoiding Overlapping ○ Displaying emotional intelligence ○ Sample Prompts/ Topics • Tip to improve Speaking Skills i. Body language and gestures ii. Facial Expressions iii. Confidence	• Oral Communication: Skills, Choices, and Consequences, 4th Edition by Kathryn Sue Young, Howard Paul Travis • Barron's IELTS 4th edition • Public Speaking by Clarence Stratton
	Week 16	**SPEAKING (PRACTICE TESTS)** ○ At English Language Lab	**Tests** • IELTS Maximiser Educational Book Speaking ○ Hometown (Questions)

			○ Country (Questions) ○ Health (Questions) • Barron's IELTS 4th edition Academic Model Speaking Test 1-4 • Kaplan Test Prep IELTS Speaking Chapter 1-4 Tests
FINAL TERM EXAMINATION			

List of Resources:

1. 501 Reading Comprehension Questions (501 Series) 5th Edition (2014) by LLC Learning express.
2. Barron's IELTS with Audio CDs Barrons Educational Series; Third Edition (2013) by Lin Lougheed Ph.D
3. Cambridge IELTS 01 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
4. Cambridge IELTS 02 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
5. Cambridge IELTS 03 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
6. Cambridge IELTS 04 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
7. Cambridge IELTS 05 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
8. Cambridge IELTS 06 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
9. Cambridge IELTS 07 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
10. Cambridge IELTS 08 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
11. Cambridge IELTS 09 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition
12. Cambridge IELTS 10 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2015)
13. Cambridge IELTS 11 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2016)
14. Cambridge IELTS 12 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2017)
15. Cambridge IELTS 13 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2018)
16. Cambridge IELTS 14 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2019)
17. Cambridge IELTS 15 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2020)
18. Cambridge IELTS 16 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2021)
19. Cambridge IELTS 17 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2022)
20. Cambridge IELTS 18 Academic Student's Book with Answers with Audio with Resource Bank. Cambridge English; New edition (2023)
21. Check Your English Vocabulary for IELTS: Essential words and phrases to help you maximize your IELTS score. Bloomsbury Information; workbook Edition (2017) by Rawdon Wyatt.
22. Comprehension That Works (Professional Resources) 1st Edition (2008) by Danny Brassell
23. Grammar for IELTS (Collins English for Exams) HarperCollins UK; None edition (2012) by Fiona Aish
24. IELTS - The Complete Guide to Academic Reading. Godiva Books (2012) by Phil Biggerton

25. IELTS Grammar For Bands 6. 5 and above. Student's Book with Answers. (Cambridge Grammar for First Certificate, IELTS, PET). Cambridge English; 1st edition (2021) by Diana Hopkins, Pauline Cullen.
26. IELTS Listening Strategies for Success (IELTS Series Book 2), Englishtec (2021), by Matt McGinniss
27. IELTS Maximiser Educational Book Speaking (2008) by Alireza Mamarzadeh
28. IELTS Vocabulary For Bands 6.5 and above With Answers and Downloadable Audio (Cambridge Vocabulary for Exams). Cambridge English; 1st edition (2021) by Pauline Cullen.
29. IELTS Vocabulary Up to Band 6.0 With Downloadable Audio (Cambridge Vocabulary for Exams) Cambridge English; 1st edition (2021) by Pauline Cullen.
30. Nixsali Leonardo, LCSW - Active Listening Techniques 30 Practical Tools to Hone Your Communication Skills (2020)
31. Objective IELTS Intermediate Self Study Student's Book with CD-ROM Cambridge English; 1st edition (2007)
32. Public Speaking: Principles and Practice (2024) by Irvah Lester Winter
33. Tips for IELTS Reading Academic/General Training Module (2015) by Adam Smith
34. Worksheets for A1 to C1 CEFR level of all modules accessed and downloaded from https://learnenglish.britishcouncil.org/

EXAMINATION PATTERN FOR EPCs
Paper timings in total (2 Hrs. 45 min)
READING MODULE: **(3 tasks, 40 Qs, 60 min) = 40 Marks / (25%)** *3 Paragraphs (40 questions in total) 60 min*
WRITING MODULE: **(2 tasks, 60 min) = 40 Marks / (25%)** *Task 01 (150 words) 20 min (15 Marks)* *Task 02 (250 words) 40 min (25 Marks)*
LISTENING MODULE: **(4 tasks, 40 Qs, 30 min) = 40 Marks / (25%)** Tests 01 & 02 (Social needs) *Test 01: Conversation (10 questions)* *Test 02: Monologue (10 questions)* Tests 03 & 04 (Academic needs) *Test 03: Conversation (10 questions)* *Test 04: Monologue (10 questions)*
SPEAKING MODULE: **(3 parts, 11-14 min) = 40 Marks / (25%)** *Part1 (Introduction) 4-5 min (15 marks)* *Part2 (Task card-based talk) 1-2 min (10 marks)* *Part3 (Discussion) 4-5 min (15 marks)*
Total Marks = 160

PERLs MODLUE

PERLs Module

Attributes	Competencies	Portfolio Entries Per Semester							
PROFESSIONALISM SKILLS		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Communicator	1. Demonstrate non-verbal, verbal, written and electronic communication skills								
	2. Communicate effectively with patients and families								
Caring & Empathic	3. Demonstrate respect of diversity in gender, age, culture, race, religion, disabilities, and sexual orientation for patients, peers, colleagues, and other health professionals.								
	4. Demonstrate empathy in patient encounters								
Responsible & Accountable	5. Follow the dress code and rules and regulation of the institution and the profession								
	6. Demonstrate punctuality								
	7. Demonstrate availability and timely delivery of patient care as and when required								
	8. Take responsibility of one's actions and be accountable to patients and teachers								
Team Player	9. Work respectfully and effectively with their peers, seniors, and juniors								
	10. Participate in different team roles								
	11. Work with other health professionals to establish and maintain a climate of mutual respect, dignity								
Self-Aware	12. Identify personal strengths and areas of improvement								
	13. Identify limits in one's own level of knowledge and expertise								
	14. Show willingness to seek help through advice and support in patient care when required								
ETHICS SKILLS									
Ethical Practitioner	15. Obtain verbal and written informed consent								

	16. Comply with relevant laws and regulation including the minimum standards of health delivery and demonstrate patient safety in all aspects of healthcare delivery								
Ethical Researcher	17. Maintain research participants confidentiality								
	18. Demonstrate awareness of publication ethics								
Digital Citizen	19. Keep professional data and information safe								
	20. Design a professional digital footprint								
	21. Understand cyberbullying, harassing, sexting, or identity theft								
RESEARCH SKILLS									
Evidence based practitioner	22. Make informed decisions based on up-to- date scientific evidence								
	23. Locate credible scientific data								
Writer & Presenter	24. Develop a research proposal								
	25. Develop a research report/article								
	26. Present in college or on scientific forums								
LEADERSHIP SKILLS									
Resilient & Adaptable	27. Demonstrate flexibility in adjusting to changing environments								
	28. Demonstrate healthy coping mechanisms to respond to stress								
Systems thinker	29. Recognize own role as contributor towards management and leadership in health services								
	30. Identify new advancements in guidelines, standards, technologies, and services that can improve patient outcomes								
Self-directed learner	31. Seek active feedback from colleagues, and other health professionals								
	32. Incorporate reflection in routine practice to set and track learning goals								
	33. Seek membership in professional networks and societies								

Allied Health Sciences

Curricula 2024

BS DENTAL TECHNOLOGY

CURRICULUM

SCHEME OF STUDIES

SEMESTER	COURSE CODE	COURSE TITLE	THEORY	PRACTICAL	CREDIT HOURS
1st Semester	GEFE	Functional English	03	00	03
	GEQR	Quantitative Reasoning-I	03	00	03
	GENS	Natural Sciences	02	01	03
	GEAH	Arts and Humanities	02	00	02
	GEICP	Ideology and Constitution of Pakistan	02	00	02
	IDC	Basic Biochemistry	03	00	03
	PERL-I	PERL-I	01	00	01
Total Credit Hours					**17**
2nd Semester	GEEW	Expository Writing	03	00	03
	GEQR	Quantitative Reasoning-II	03	00	03
	GESS	Social Sciences	02	00	02
	GEIE	Islamic Studies/Ethics	02	00	02
	BAN	Basic Anatomy	03	00	03
	BPH	Basic Physiology	03	00	03
	PERL-II	PERL-II	01	00	01
Total Credit Hours					**17**
3rd Semester	GEE	Entrepreneurship	02	00	02
	GECCM	Citizenship Education and Community Engagement	02	00	02
	GEICT	Applications of Information and Communication Technologies	02	01	03
	GPA	General Pathology	03	00	03
	TM	Tooth Morphology	02	01	03
	DO	Dental Occlusion	01	01	02
	EPC-1	English Proficiency-1	02	00	02
	PERL-III	PERL-III	01	00	01
Total Credit Hours					**18**

4th Semester	FSDM	Fundamentals of Science of Dental Materials	02	00	02
	OB	Oral Biology	03	00	03
	PDM	Prosthetic Dental Materials	02	01	03
	PDA	Partial Denture Acrylic	01	03	04
	OP	Oral Pathology	02	01	03
	PS	Pakistan Studies	02	00	02
	EPC-2	English Proficiency-2	02	00	02
	PERL-IV	PERL-IV	01	00	01
Total Credit Hours					**20**
5th Semester	RDM	Restorative Dental Materials	01	01	02
	PD	Periodontology	02	00	02
	FO	Fundamentals of orthodontics	01	02	03
	CPAD	Cast Partial Denture	02	02	04
	FFP	Fundamentals of fixed Prosthodontics	02	02	04
	FOMR	Fundamentals of Oral and maxillofacial radiology	01	01	02
	EPC-3	English Proficiency-3	02	00	02
	PERL-V	PERL-V	01	00	01
Total Credit Hours					**20**
6th Semester	FMR	Fixed Metal Restorations	01	03	04
	PCD	Preventive & Community Dentistry	02	00	02
	MO	Myofunctional Orthodontics	01	02	03
	CPD-I	Complete Denture Prosthodontics-I	01	02	03
	CPD-II	Complete Denture Prosthodontics-II	01	02	03
	EPC-4	English Proficiency-4	02	00	02
	PERL-VI	PERL-VI	01	00	01
Total Credit Hours					**18**
7th Semester	DDT	Digital Dental technology	02	01	03
	BBM	Biosafety and Biowaste Management	03	00	03
	RO	Removable Orthodontic Appliances	01	03	04

	MP	Maxillofacial Prosthodontics	01	01	02
	In	Internship/Field Experience	03	00	03
	EPC-5	English Proficiency-5	02	00	02
	PERL-VII	PERL-VII	01	00	01
Total Credit Hours					**18**
8th Semester	IMD	Implant Dentistry	01	01	02
	FOP	Fixed orthodontic appliances	01	02	03
	ADP	Advanced Prosthodontics	02	01	03
	CR	Ceramic Restorations-I	01	02	03
	CR	Ceramic Restorations-II	01	02	03
	Cap	Capstone Project	03	00	03
	EPC-6	English Proficiency-6	02	00	02
	PERL-VIII	PERL-VIII	01	00	01
Total Credit Hours					**20**

TOOTH MORPHOLOGY

Credit Hours 03 (2+1)

Learning Outcomes/Objectives: At the end of this course students will be able to identify shape, size and distinguishing features of the teeth.

- Define tooth morphology and explain its significance in dental technology and oral health.
- Identify and describe the primary anatomical features of teeth, including crowns, roots, cusps, fossae, and ridges.
- Describe the unique morphological characteristics of each type of tooth and their functions in the oral cavity.
- Use and interpret various dental notation systems, including the Universal Numbering System, the Palmer Notation Method, and the FDI World Dental Federation notation.
- Understand relationship of deciduous and permanent teeth

Course Content		SEQs	MCQs
I.	Dental arches and their classification	1	4
II. III.	Form and arrangement of teeth Geometric shapes of the crowns	---	5
IV. V.	Numbering systems of teeth Difference between deciduous and permanent teeth	1	5
VI. VII.	General characteristics of maxillary teeth Morphological features of all (individual) maxillary and deciduous and permanent teeth	2	8
VIII. IX.	General characteristics of mandibular teeth Morphological features of all (individual) mandibular deciduous and permanent teeth	2	8

Practical		OSPE
I.	Developing plaster replicas of single teeth to study geometric shapes of maxillary and mandibular teeth, wax/soap carvings of to practice morphology of teeth.	3
II.	Developing models of dental arches, arrangement of teeth, relationship of teeth.	
III.	Carving cavity design in plaster teeth.	

Recommended Books

- Concise Dental Anatomy and Morphology- James L. Fuller, Gerald E. Denechy, Thomas M. Schulein.

DENTAL OCCLUSION

Credit Hours 02 (1+1)

Learning Outcomes/Objectives: At the end of this course the students will be able to determine functional relationship of teeth during chewing and at rest.

- Define dental occlusion and explain its significance in dental health and function.
- Describe the anatomical structures involved in occlusion, including teeth, temporomandibular joints (TMJs), and masticatory muscles.
- Explain the concepts of centric relation and centric occlusion, and distinguish between the two.
- Describe the various classifications of malocclusion (Class I, II, and III).
- Conduct a thorough occlusal analysis using appropriate diagnostic tools and techniques, such as study models.
- Identify occlusal disorders, including tooth wear, mobility, and TMJ dysfunction.
- Assess the role of occlusion in the etiology of orofacial pain and temporomandibular disorders (TMD).
- Discuss the principles of designing occlusal surfaces in restorative dentistry to achieve optimal function and aesthetics.

Course Content	SEQs	MCQs
I. Occlusion i. Alignment and occlusion of dentition ii. Determinants of occlusal morphology iii. Temporomandibular disorders. iv. Occlusal appliances types and therapy v. Use of articulators in occlusal therapy	1	5
II. Internal Derangements of TMJ **III. Splint Therapy for Internal Derangements of TMJ**	1	5
IV. Myofacial Pain i. Splint Therapy for Myofacial Pain/Bruxism ii. Various types of jaws splint classification and uses	1	5

Practical	OSPE
I. Tooth set up exercises II. Articulation exercises	3

Recommended books:

- Management of temporomandibular disorders and occlusion. Jeffrey P. Okeson. 6th Edition

FUNDAMENTALS OF SCIENCE OF DENTAL MATERIALS

Credit Hours 02 (2+0)

Learning Outcomes/Objectives:

At the end of this course students will be able to understand basics of dental materials science including their structure, classifications, properties and behaviors.

- Classify dental materials into various categories, such as restorative, preventive, therapeutic, and impression materials.
- Describe the physical, chemical, mechanical, and biological properties of dental materials.
- Understand the protocols for mixing, handling, and applying these materials for fabrication of dental prostheses in the dental laboratory.
- Explain the concept of biocompatibility, safety protocols and guidelines for handling dental materials to prevent occupational exposure and ensure safety.
- Analyze case scenarios to select the most appropriate dental material based on patient needs and material properties.

Course Content	SEQs	MCQs
I. Dental materials i. Overview of materials for dental applications ii. Historical use of dental materials iii. Standards for dental materials iv. International standards	1	5
II. Structure of Matter and Principles of Adhesion i. Interatomic bonds ii. Metallic bonds iii. Thermal energy iv. Crystalline and non-crystalline structure v. Diffusion vi. Adhesion and Bonding	1	5
III. Properties of Dental Materials: i. Basic terminology and definitions. ii. Physical and mechanical properties	1	5
IV. Stress, strain and modulus of elasticity.	1	5
V. Thermal properties **VI. Optical properties.**	1	5
VII. Biocompatibility of dental materials	1	5

Recommended books:

- Phillip's Science of Dental Materials. Anusavice 12th Edition.
- McCabe JF, Walls AW, editors. Applied dental materials. 9th Edition.
- Bagby MD, Gladwin M. Clinical aspects of dental materials. Lippincott Williams 4th Edition.

ORAL BIOLOGY

Credit Hours 03 (3+0)

Learning Outcomes/Objectives:

At the end of this course, the student will be able to develop knowledge of structure, development and function of oral tissues.

- Define oral biology and its significance in dental technology.
- Explain the anatomical structures and functions of the oral cavity, including teeth, gums, mucosa, and salivary glands.
- Describe the physiological processes involved in oral health maintenance, such as mastication, speech, and swallowing.
- Analyze the microstructure of teeth, including enamel, dentin, cementum, and pulp.
- Understand the development and eruption of teeth, including the stages of odontogenesis.
- Explain the biochemical mechanisms underlying tooth mineralization, demineralization, and remineralization.
- Discuss the role of saliva in maintaining oral homeostasis and its implications for dental health.

Course Content		SEQs	MCQs
I.	**General Embryology**; Germ layers, Neuro-ectoderm, Neural crest cells	1	5
II.	**Oral Embryology**; Developmental stages of teeth, Eruption, Shedding.	1	5
III.	**Oral cavity**; Oral mucosa, Lips and cheek, Vestibule of mouth, Hard palate, soft palate, Neuro -vascular supply (Distribution of trigeminal nerve in the oral cavity).	1	7
IV.	**Tongue**; Specialized mucosa, Muscles of Tongue.	---	2
V.	**Hard Dental Tissue**; Enamel, Dentin, Cementum.	1	6
VI.	**Dental Soft Tissue**; Pulp, Periodontal ligament.	1	3
VII.	**Salivary glands**: parotid, submandibular and sublingual; Morphology and relations of the salivary glands, Nerve supply and blood supply	1	5
VIII.	**Temporo-mandibular joint**; External features, Bio-mechanics, Stability, Blood supply, nerve supply and lymphatic drainage, Muscles of mastication.	2	7
IX. X. XI. XII.	**Mastication** **Swallowing/** **Deglutition** **Phonetics**	1	5

Recommended Instructional / Reading Materials:

Ten Cate's Oral Histology: development, structure, and function. 9th Edition.

PROSTHETIC DENTAL MATERIALS

Credit Hours 03 (2+1)

Learning Outcomes/Objectives: At the end of this course students will be able to understand and develop practical skills of manipulating different materials used in prosthetic dentistry.

- Identify various types of prosthetic dental materials commonly used in dental prostheses fabrication.
- Discuss how material properties influence the selection and performance of dental prosthetics.
- Explain the chemical composition of different types of prosthetic dental materials.
- Demonstrate proper techniques for handling, manipulating, and mixing prosthetic dental materials.
- Describe various fabrication techniques used with prosthetic dental materials, including casting, pressing, and curing.
- Discuss techniques and materials used for model, die materials and denture bases.

Course Content	SEQs	MCQs
I. Impression Materials i. Classification of Impression materials, Ideal properties of Impression materials, ii. Impression Compound**:** Low Fusing Impression compound uses properties and composition, High Fusing Impression compound uses properties and composition, iii. Impression Pastes; Zinc oxide eugenol impression paste uses properties and composition, Eugenol free impression paste, uses, properties and composition. Hydrocolloids: Alginate iv. Impression Material uses properties and composition v. Agar Impression Material uses properties and composition. vi. Elastomeric Impression Materials: Introduction to elastomers, vii. Polysulfide Impression Materials uses properties and composition viii. Polyether Impression Materials uses properties and composition ix. Silicones: Addition Silicone Impression Materials uses properties and composition, Condensation Silicone Impression Materials uses properties and composition.	2	7
II. Cast and Die Materials i. Definitions and types**,** Ideal properties of cast and die material ii. Materials used for cast and die fabrication**.** iii. Gypsum products: Classification, Uses and Ideal properties, manufacturing methods, setting reaction & manipulation variables	1	3

iv. Factors affecting Setting time, Composition and role of additives		
III. Denture base resins: i. Classification of denture base resins, ii. Monomer, Polymer and Types of polymerization techniques iii. Heat cure acrylic resin, auto polymerized acrylic resin, iv. Steps of removable denture fabrication, v. Tissue conditioners, vi. Denture relining material, vii. Denture rebasing material, viii. Porosities & processing defects. **IV. Artificial Teeth** i. Acrylic resin teeth, ii. Porcelain teeth. V. **Separating Media** i. Cold mold seal, ii. Cellophane and Cellulose sheets iii. Aluminum and Tin foil.	1	8
VI. **Dental waxes** i. Classification and ideal properties ii. Composition, uses, manipulation and properties, Inlay wax**,** Casting waxes**,** Base plate wax**,** Utility waxes**,** Boxing wax**,** Impression wax, Bite registration wax.	1	5
VII. **Casting and Investment** i. Lost wax technique**,** Steps & equipment used for casting**,** Types of casting, Casting Defects. ii. **Dental investments:** Classification and uses**,** Ideal properties & manipulation. iii. **Gypsum bonded investment:** Composition, Properties, Uses. **Phosphate bonded investments:** Composition, Properties, Uses. iv. **Silica bonded investments:** Composition, Properties, Uses.	1	7

Practical	**OSPE**
I. Identification of all Laboratory based materials II. Manipulation of Dental plaster III. Manipulation of Dental waxes IV. Manipulation of Denture base polymers V. Manipulation of Impression materials.	3

Recommended Books:

- Phillip's Science of Dental Materials. Anusavice 12th Edition.
- McCabe JF, Walls AW, editors. Applied dental materials. 9th Edition.
- Bagby MD, Gladwin M. Clinical aspects of dental materials. Lippincott Williams 4th Edition.

PARTIAL DENTURE-ACRYLIC
Credit Hours 04 (1+3)

Learning Outcomes/Objectives: At the end of this course students will be able to develop knowledge and skill of partial dentures that are fabricated with acrylic resins.

- Define partial dentures and acrylic materials commonly used in their fabrication.
- Explain the role of partial dentures in restoring function and aesthetics for patients with missing teeth.
- Outline the step-by-step process of fabricating partial dentures using acrylic materials.
- Describe the principles of impression making, model preparation, and jaw relation records specific to partial dentures.
- Demonstrate proficiency in wax-up techniques for setting teeth and designing the framework of partial dentures.
- Discuss the properties of acrylic materials used in partial denture fabrication, including strength, esthetics, and biocompatibility.
- Evaluate different types of acrylic resins available for partial denture fabrication and their respective advantages and limitations.
- Demonstrate proper handling techniques for acrylic materials, including mixing, pouring, and curing procedures.
- Modify and adjust acrylic bases and framework components to achieve optimal fit, stability, and comfort for the patient.
- Perform finishing and polishing procedures to enhance the esthetics and surface smoothness of acrylic denture bases.
- Identify common defects and imperfections in acrylic dentures and apply appropriate corrective measures.
- Ensure proper occlusal contacts and occlusal balance during the finishing process to optimize function and patient comfort.
- Understand the requirement of chairside adjustments by the dental surgeon during relining procedures to optimize the fit and comfort of partial dentures for the patient.
- Demonstrate proficiency in documenting procedures, maintaining records, and ensuring traceability of materials used in partial denture fabrication.
- Emphasize the importance of infection control and sterilization practices to prevent cross-contamination and ensure patient safety.

Course Content		SEQs	MCQs
I.	Equipment and instruments	---	---
II.	Classification of Partial dentures	---	1
III.	Difference between cast and acrylic partial denture		
IV.	Component parts of partial denture	1	2
V.	Basic Principles of partial denture design		

VI. VII. VIII.	Handling of impression, disinfection and cast formation Jaw relations and articulation Model duplication	1	3
IX. X. XI.	Articulators; plane-line Designing of special cases acrylic partial denture Wax pattern formation	----	2
XII. XIII. XIV.	Types of direct retainers for acrylic partial denture Selection of teeth Teeth set up for partial denture	---	2
XV. XVI.	Flasking and curing Procedures of Acrylic partial denture Laboratory procedures	1	2
XVII. XVIII. XIX.	Immediate partial dentures Relining partial denture Repairs and addition to removable partial dentures	---	2
XX. XXI.	Finishing and polishing of removable partial dentures Management of processing defects	---	1
Practical			**OSPEs**
I.	Parts of partial denture, surveying, Designing, Construction of wax pattern, flasking, curing, finishing and polishing of acrylic partial denture, brief description of articulators and articulation, carving of teeth in plasticine, carving out wax patterns in modelling wax, Post insertion complaints and follow up. Selection of teeth and teeth setup for partial denture, Immediate dentures, Repair and Relining of partial dentures, Finishing and polishing procedures.		05
II.	**Exercises:** Teeth set up exercises, flasking and curing exercises, finishing and polishing. Construction of acrylic upper gum fit denture, upper and lower partial dentures mounted on articulators, wire work, repairs, relining and rebasing of prostheses.		03
III.	Designing of acrylic partial denture		01

Recommended Books:

- McCraken's Removable partial denture prosthodontics, 12th edition, Alan B. Carr, David T. Brown.
- Basics of Dental Technology, step by step approach, 2nd edition, Tony Jhonsan, David G. Patrick, Christopher W. Stokes, David G. Wildgoose, Duncan J. Wood.

ORAL PATHOLOGY

Credit Hours 03 (2+1)
Learning Outcomes/Objectives:

At the end of this course students will be able to develop an understanding of causes, processes and effects of oral diseases.

- Explain the basic principles of oral disease classification.
- Identify normal oral structures and tissues using histological slides and anatomical models.
- Explore the etiology and pathogenesis of common oral diseases, including dental caries, periodontal diseases, and oral cancer.
- Discuss the role of risk factors such as diet, tobacco use, and systemic conditions in oral pathology.
- Interpret diagnostic aids such as radiographs, biopsies, and laboratory tests in the diagnosis of oral diseases.
- Understand the principles of treatment for various oral diseases, including preventive measures, restorative techniques, and surgical interventions.
- Discuss the role of dental technology in fabricating prosthetic devices for patients with oral pathologies, such as crowns, bridges, and dentures.

Course Content	SEQs	MCQs
I. Developmental Anomalies i. Odontome, Concrescence, Gemination, Fusion, ii. Microdontia, Macrodontia, Anodontia, Hypodontia, iii. Supernumerary teeth, Taurodontism, iv. Appearance & etiology of Hypoplastic teeth, v. Dentinogenesis Imperfecta, vi. Amelogenesis Imperfecta, vii. Cleft lip and palate.	1	5
II. Physical & Chemical Injuries i. Teeth: intrinsic & extrinsic staining, Attrition, Abrasion, erosion, Avulsion, Bruxism ii. Gingiva: toothbrush & Toothpick trauma, Mucosal injuries, Factious injuries, Thermal burns	1	5
III. Caries i. Types of caries, Process of caries, Enamel caries, Dentin caries.	1	5
IV. Ulcerations i. Common causes of ulcerations, ii. Acute ulcers: iii. Traumatic & Apthous, iv. Chronic ulcers: v. Tuberculosis	1	5
V. Oral Neoplasia	1	5

i. Benign & malignant lesions of epithelium and mesenchyma, Squamous cell carcinoma.		
VI. Cyst & Bone Lesions i. Radicular cyst, Traumatic bone cyst, Eruption/Gingival cyst, Dentigerous Cyst, Odontogenic, Keratocyst,Tori, Exostoses, ii. Common tumors of bone & Odontogenic origin, Osteosarcoma, Ameloblastoma & Odontoma.	1	5

Practical	**OSPE**
• Anomalies: (identification & drawing) • Physical & chemical injuries: (identification & drawing) • Ulceration: (Non-specific ulcer; slide identification & drawing	3

Recommended Books:

Contemporary Oral and Maxillofacial Pathology, Second Edition.

Allied Health Sciences
Curricula 2024

BS MEDICAL IMAGING TECHNOLOGY

CURRICULUM

SCHEME OF STUDIES

SEMESTER	COURE CODE	COURSE TITLE	THEORY	PRACTICAL	CREDIT HOURS
1st Semester	GEFE	Functional English	03	00	03
	GEQR-I	Quantitative Reasoning-I	03	00	03
	GENS	Natural Sciences	02	01	03
	GEAH	Arts & Humanities	02	00	02
	GEICP	Ideology & Constitution of Pakistan	02	00	02
	IDBB	Basic Biochemistry	03	00	03
	PERL-I	PERL-I	01	00	01
Total Credit Hours					**17**
2nd Semester	GEEW	Expository Writing	03	00	03
	GEQR-II	Quantitative Reasoning-II	03	00	03
	GESS	Social Sciences	02	00	02
	GEIE	Islamic Studies/Ethics	02	00	02
	IDBA	Basic Anatomy	03	00	03
	IDBP	Basic Physiology	03	00	03
		Medical Physics in MIT	03	00	03
	PERL-II	PERL-II	01	00	01
Total Credit Hours					**20**
3rd Semester	GEE	Entrepreneurship	02	00	02
	GECCM	Civics and Community Engagement	02	00	02
	GEICT	Applications of Information and Communication Technologies	02	01	03
	IDGP	General Pathology	03	00	03
	GIA-I	Gross and Imaging Anatomy-I	03	01	04
	GR-I	General Radiography-I	02	01	03
	EPC-I	English Proficiency-I	02	00	02
	PERL-III	PERL-III	01	00	01
Total Credit Hours					**20**
4th Semester	GIA-II	Gross and Imaging Anatomy-II	03	01	04
	GR-II	General Radiography-II	02	01	03
	RST	Radiation Sciences for Technologist	03	00	03
	PCD	Pharmacology and Clinical Decision making in Imaging	03	00	03

	MD	Medicine	03	00	03
	PS	Pakistan Studies	02	00	02
	EPC-2	English Proficiency-2	02	00	02
	PERL-IV	PERL-IV	01	00	01
Total Credit Hours					**21**
5th Semester	RRP	Radiobiology and radiation Protection	03	00	03
	NA	Neuroanatomy	02	01	03
	UPI	Ultrasound Physics and Instrumentation	02	01	03
	CM	Contrast Media	02	00	02
	MG	Mammography	02	01	03
	FSR	Fluoroscopy and Special Radiological Technique	02	01	03
	EPC-3	English Proficiency-3	02	00	02
	PERL-V	PERL-V	01	00	01
Total Credit Hours					**20**
6th Semester	ECG	Echocardiography	02	01	04
	SI	Surgical Imaging	02	01	03
	PCC	Patient Centered Care	01	01	02
	UDI	Ultrasound & Doppler Imaging	02	02	04
	II	Imaging Informatics	02	01	03
	AIR-I	Angiography and Interventional radiology-I	02	01	03
	EPC-4	English Proficiency-4	02	00	02
	PERL-VI	PERL-VI	01	00	01
Total Credit Hours					**22**
7th Semester	AIR-II	Angiography and Interventional Radiology-II	02	01	03
	CT-I	Computed Tomography-I	02	01	03
	MRI-I	Magnetic Resonance Imaging I	02	01	03
	NM-I	Nuclear Medicine-I	02	01	03
	SIRM	Scientific Inquiry & Research Methodology	02	01	03
	Int.	Internship/Field Experience	00	03	03
	EPC-5	English Proficiency-5	02	00	02
	PERL-VII	PERL-VII	01	00	01
Total Credit Hours					**21**
8th Semester	NM-II	Nuclear Medicine-II	02	02	04
	MRI-II	Magnetic Resonance Imaging-II	02	02	04

	CT-II	Computed Tomography-II	02	02	04
	Res.	Research Project	00	03	03
	ES	Elective Subject	01	01	02
	EPC-6	English Proficiency-6	02	00	02
	PERL-VIII	PERL-VIII	01	00	01
Total Credit Hours					**20**

Gross and Imaging Anatomy-I
Credit hour 4(3+1)

General learning objectives

At the end of the course the student will be able to

1. Describe the topographical anatomy of the region
2. Describe and identify the course, relations, branches/ tributaries and areas of distribution of neurovascular components of the region.
3. Demonstrate and explain the mechanisms involved in movements at various joints of the region
4. Explain and identify the various modifications of superficial/ deep fascia
5. Describe and identify the peritoneal reflection, compartments, fossae and ligaments
6. Describe and identify the location, relations, neurovascular supply of the viscera
7. Describe the anatomical basis for the clinical conditions of the region
8. Describe the radiological and cross-sectional anatomy of the region

Upper limb, Lower limb, back and Thorax

Topic	Assessment	
	MCQ	SEQ
Osteology	01	01
Thoracic Wall Intercostal spaces	02	
Joints and Respiratory Movements	01	
Diaphragm	01	
Pleura and LUNGS	03	01
Mediastinum	04	01
Pericardium and Heart	03	01
Bones of upper limb	02	01
Arthrology	02	
Axilla, Breast, Pectoral Region, Scapular Region, Brachial Plexus	03	
Arm; Neurovascular Bundle, Fasciae and compartments	02	
Forearm; Neurovascular Bundle, Fasciae and compartments	03	01
Hand; Palmar and Dorsal Aspect, Fasciae and compartments	03	
Bones of lower limb: hip bone, femur, tibia, fibula, bones of foot, patella	02	01
Atrthrology: sacro-iliac joint, hip joint, knee joint, ankle, Carpometacarpal Joints, Metacarpophalangeal Joints, Interphalangeal Joints & tibi-fibular articulations	02	
Gluteal Region	02	01
Femoral triangle, popliteal fossa, adductor canal,	02	

Thigh ; Neurovascular Bundle, Muscles, Fasciae and compartments	02	
Leg ; Neurovascular Bundle, Muscles, Fasciae and compartments	02	01
Foot planter and dorsal Aspect, Fasciae and compartments	02	
Arches of foot, mechanism of walking	01	
Total	**45**	**9**

PRACTICAL:

Topic	**OSPEs/stations**
Upper Limb & Lower Limb	01
Thorax (heart + lungs & mediastinum)	01
Radiographs	01
Total	**03**

Recommended readings

1. Snell. R.S. Clinical Anatomy for Medical Students. Philadelphia USA Llippincot Williams and Wilkins:Latest Ed.
2. Sinnatamby C.S.Lasts Anatomy Regional and Applied London, Churchill Living Stone: Latest Ed.
3. Williams, P.L. Bannister, L.H. Berry, M.B, Collins, P., Dyson M. Ferguson, M.WJ. Gray's Anatomy London. Churchill living stone: Latest Ed.
4. Moore K.L. Clinically Oriented Anatomy. Baltimore, U.S.A. Williams and Wilkins: Latest Ed.

Journals:

1. Journal of Anatomy
2. Anatomy and Embryology
3. Anatomia, Histologia, Embryologia
4. American journal of anatomy
5. British journal of Anatomy

GENERAL RADIOLOGRAPHY-I
Credit Hours 3(2+1)

Learning Outcomes/Objectives:

1. Demonstrate standard positioning terms and proper use of positioning aids.
2. Discuss general procedural considerations for radiographic exams.
3. Identify methods and barriers of communication and describe how each may be used or overcome effectively during patient education.
4. Explain radiographic procedures to patients/family members.
5. Identify the structures demonstrated on routine radiographic images.
6. Simulate radiographic procedures on a person or phantom in a laboratory setting.
7. Evaluate images for positioning, centering, appropriate anatomy and overall image quality.
8. Discuss equipment and supplies necessary to complete basic radiographic procedures.
9. Explain the routine and special positions/projections for all radiographic procedures.

Content	MCQs	SEQs
• **Basic Principles of Radiography and Digital Technology**	02	--
• **Standard Terminology for Positioning and Projection: Standard terms;** Radiographic position, Radiographic projection, Radiographic view.	02	--
• **Positioning terminology**; Recumbent, Supine, Prone, Trendelenburg, Decubitus, Erect/upright**,** Anterior position, Posterior position, Oblique position.	03	1
• **Terminology of movement and direction;** Cephalad/caudad, inferior/superior, Proximal/distal, Plantar/palmar, Pronate/supinate, Flexion/extension, Abduction/adduction, Inversion/eversion, Medial/lateral**.**	03	1
• **General planes;** Sagittal or mid-sagittal, Coronal or mid-coronal, Transverse, Longitudinal**.** • **Positioning aids;** Sponges**,** Sandbags.	02	0.5
• **Immobilization devices;** Accessory equipment, Calipers Lead strips, Lead shields or shadow shields, Lead markers, Image receptor holders**.** General Considerations**:**	03	0.5
• **Evaluation of radiographic requests;** Patient identification**,** Verification of procedure(s) requested**,** Review of clinical history**,** Clinical history and patient assessment**,** Role of the radiographer**,** questioning skills**,** Chief complaint**,** Allergy history**,** Localization**,** Chronology**,** Severity**,** Onset**,** Aggravating or alleviating factors**,** Associated manifestations**,** Special	03	0.5

considerations**,** Exam sequencing**.**		
• **Room preparation;** Cleanliness, organization and appearance**,** Necessary supplies and accessory equipment available	**02**	**0.5**
• **Upper limb & shoulder** • **Lower limb** • **Hip joint and sacroiliac Joint** • **Bony thorax and airway** • **Vertebral column** • **Special studies,** Bone survey**,** Long bone measurement**,** Bone age**,** Foreign body	10	02
Total	30	06

Practical:

Content	OSPE
Upper limb and Lower Limb	01
Hip joint, sacroiliac Joint, vertebral column	01
Bony thorax and airway	01
Total	**03**

RECOMMENDED BOOKS

1. Radiographic positioning: Ronald L Eisenberg, (1989)
2. Clark's Positioning in Radiography: A. Stewart Whitley, Gail Jefferson, Ken Holmes, Charles Sloane, Craig Anderson, Graham Hoadley,13 edition (2015)
3. Anatomy for diagnostic imaging: Stephanie Ryan and Michelle Mc Nicholas, 3rd Edition (2010)

Gross and Imaging Anatomy-II

Credit hour 04 (03+01)

Abdomen & Pelvis + Head & Neck

General learning objectives

At the end of the course the student will be able to

1. Describe and identify the topography of head and neck
2. Identify and describe the topographical features of the bones with ossification.
3. Describe the course, relations, branches/ tributaries and areas of distribution of neurovascular components of the region.
4. Demonstrate and explain the mechanisms involved in movements at various joints of the region
5. Explain the various modifications of superficial/ deep fascia
6. Describe and identify the location, relations and neurovascular supply of the viscera
7. Describe the anatomical basis for the clinical conditions of the region

Table of specifications
Abdomen & Pelvis + Head & Neck

Semester; 4th **Total credit hours 03+1** **Multiple Choice Questions; 45** **SEQs: 06**		
Topic	**Assessment**	
	MCQ	SEQ
Osteology (Skull , mandible, vertebrae and hyoid bone) Joints of Head and Neck	02	1
Face	1	
Scalp	1	
Parotid region	1	
Neck and sub-occipital region	2	1
Temporal and infra-temporal fossae	1	1
Pterygopalatine fossa	1	
Nose and paranasal sinuses	1	
Oral cavity and palate	2	
Pharynx	2	1
Larynx	2	
Eye and orbit	2	1
Ear	1	
Meninges and Dural venous sinuses	2	
Bones of pelvic girdle	4	1
Anthology:		
Abdominal and pelvic walls, incisions, planes and quadrants		

Neurovasculature of abdomen and pelvis	5	
Sympathetic chain and its distribution	1	
Abdominal and pelvic viscera	12	2
Plexuses	1	1
Perineum	2	
Total	**45**	**9**

Practical:

Topics	**OSPE**
Head and Neck	01
Abdomen (supracolic and Infracolic compartment)	01
Pelvis	01
Total	**03**

Recommended readings

- Snell. R.S. Clinical Anatomy for Medical Students. Philadelphia USA Llippincot Williams and Wilkins:Latest Ed.
- Sinnatamby C.S.Lasts Anatomy Regional and Applied London, Churchill Living Stone: Latest Ed.
- Williams, P.L. Bannister, L.H. Berry, M.B, Collins, P., Dyson M. Ferguson, M.WJ. Gray's Anatomy London. Churchill living stone: Latest Ed.
- Moore K.L. Clinically Oriented Anatomy. Baltimore, U.S.A. Williams and Wilkins: Latest Ed.

Journals:

- Journal of Anatomy
- Anatomy and Embryology
- Anatomia, Histologia, Embryologia
- American journal of anatomy
- British journal of Anatomy

GENERAL RADIOGRAPHY-II

Credit Hours 03(2+1)

Learning Outcomes/Objectives

1. Demonstrate proper use of positioning aids.
2. Explain radiographic procedures to patients/family members.
3. Modify directions to patients with various communication problems.
4. Develop an awareness of cultural factors that necessitate adapting standard exam protocols.
5. Identify the structures demonstrated on routine radiographic images.
6. Simulate radiographic procedures on a person or phantom in a laboratory setting.
7. Evaluate images for positioning, centering, appropriate anatomy and overall image quality.
8. Discuss equipment and supplies necessary to complete basic radiographic procedures.
9. Explain the routine and special positions/projections for all radiographic procedures.
10. Apply general radiation safety and protection practices associated with radiography

Course Content:

- **Abdomen and Pelvic Cavity**
- **Skull, facial bones and sinuses**
- **Skull lines;** Glabellomeatal line, interpupillary line, Orbitomeatal line, Infraorbitomeatal line, Acanthiomeatal line, Mentomeatal line.
- **Skull landmarks;** Auricular point **,** Gonion (angle), Mental point, Acanthion, Nasion **,** Glabella, Inner canthus, Outer canthus, Infraorbital margin, Occlusal plane, External auditory meatus , Mastoid tip.
- **Cranium:** Skull**,** Facial bones**,** Nasal bone**,** Orbits/optic foramina**,** Zygomatic arches**,** Mandible**,** Temporomandibular articulations**,** Paranasal sinuses**.**
- **Dental Radiography**
- **Ward Radiography**
- **Pediatric Radiography**
- **Bariatric radiography**
- **Trauma radiography**
- **Forensic Radiography**
- **Macroradiography**

Table of Specification

Content	Mcqs	Seqs
Abdomen & Pelvis	10	02
Skull, facial bones and sinuses	06	01
Ward radiography	05	01
Pediatric radiography	03	01
Trauma radiography	03	01
Forensic radiography	03	00
Total	**30**	**06**

Practical:

Content	OSPE
Abdomen & Pelvis	01
Skull, facial bones and sinuses	
Ward radiography	01
Pediatric radiography	
Trauma radiography	01
Forensic radiography	
Total	**03**

RECOMMENDED BOOKS:

1. Radiographic positioning: Ronald L Eisenberg, (1989)
2. Clark's Positioning in Radiography: A. Stewart Whitley, Gail Jefferson, Ken Holmes, Charles Sloane, Craig Anderson, Graham Hoadley,13 edition (2015)
3. Anatomy for diagnostic imaging: Stephanie Ryan and Michelle Mc Nicholas, 3rd Edition (2010)

RADIATION SCIENCE FOR TECHNOLOGISTS

Credit hours (03+0)

Objective:

1. To provide quality patient care in routine as well as advanced imaging procedures.
2. To Use digital imaging and information technology equipments competently, through application of the principal and theories of its operation.
3. To Evaluate performance characteristics of equipments
4. To implement an effective radiation protection program.
5. To apply the knowledge of sectional anatomy to relate clinical procedures.
6. To Enhance human interaction and performance in a clinical environment by integrating liberal education principles

Table of Specification

Course Content	MCQs	SEQs
1. The X-ray Machine X ray imaging system Shapes and Sizes X-ray Tube Operating Console High-Voltage Section X-ray Tube Rating Charts	**10**	**2**
2. X-ray Production Electron-Target Interaction X-ray Emission Spectrum Factors Affecting the X-ray Emission Spectrum	**5**	**1**
3. X-ray Emission X-ray Quantity X-ray Quality		
4. The Medical Image Radiographic Film and Intensifying Screens, Film Construction and Formation of Latent Image Processing the Latent Image, Processing Methods, Digital radiography, Digital radiographic Techniques, image Acquisition	**5**	**1**
5. Beam-Restricting Devices Production of Scatter Radiation Control of Scatter Radiation **6. The Grid** Control of Scatter Radiation Characteristics of Grid Construction Measuring Grid Performance Types of Grids Use of Grids Grid Selection	**5**	**1**
7. Radiographic Quality	**6**	**1**

Film Factors Subject Factors Considerations for Improved Radiographic Quality		
8. Radiographic Exposure Kilovolts Peak Milliamps Exposure Time Milliampere-Seconds Distance Imager Characteristics	**5**	**1**
9. Radiographic Techniques Patient Factors Image Quality Factors Radiographic Technique Charts Automatic Exposure Techniques	**5**	**1**
10. Introduction to Therapeutic Radiology Therapeutic Radiology Gamma Radiations and Other ionizing radiotherapy	**4**	**1**
Total	**45**	**09**

Recommended Books

- Radiologic Science for Technologists. Physics, Biology, and Protection. 12th Edition - July 22, 2020. Author: Stewart C. Bushong. Hardback ISBN: 9780323749558.

Pharmacology and Clinical Decision-Making in Imaging

Credit hours 03 (03+0)

Learning Objectives:

- Identify key drug laws impacting consumer safety.
- Differentiate drug names and acceptable medication order symbols.
- Explain drug metabolism and its variables within the body.
- Apply responsible drug administration principles to prevent errors in patient care.

Course Content:	MCQs	SEQs

I. The Role of Imaging Professional
• Controlled substances
• Herbal products
• Charting
• Drug references
• Medication Orders
  ○ Route of drug administration
  ○ Medication components
  ▪ Patient identifiers
  ▪ Medication
  • Dosage
  • Quantity
  • Route
  • Time
	4	1

II. Principles of Pharmacology • Introduction • Drug Nomenclature • Legend drugs • The legal prescription • Controlled substances • Herbal products • Charting • Drug references	4	1

III. Medication Orders
• Route of drug administration
• Medication components
  i. Patient identifiers
  ii. Medication
  1. Dosage
  2. Quantity
  3. Route
  4. Time
	4	1

IV. Pharmacotherapeutic Decision-making • Drug effects and indications	4	1

• Pharmacokinetics & Pharmacodynamics i. Absorption ii. Distribution iii. Metabolism iv. Excretion v. Half-Life vi. Therapeutic index vii. Drug interactions 1. Synergism 2. Potentiation 3. Antagonism		
V. Drugs by Body System:		
A. Autonomic nervous system drugs • Adrenergics (sympathomimetics) • Adrenergic blockers (alpha and beta blockers) • Cholinergics (parasympathomimetics) • Cholinergic blockers (anticholinergics)	2	1
B. Central nervous system drugs • Anesthetics, sedatives and hypnotics • Anticonvulsants • Parkinson disease medications • Alzheimer disease medications • Neurologic and psychotropic medications • Alcohol and drugs of abuse • Antimetabolic medications	2	1
C. Urinary system drugs • Diuretics • Gout medications • Antispasmodics • Cholinergics • Prostatic medications • Alpha blockers • Overactive bladder medications	2	
D. Gastrointestinal drugs • Reflux medications • Ulcerative disease medications • Inflammatory bowel disease medications • Antispasmodics • Cholinergic blockers (anticholinergics) • Gastrointestinal motility and function medications • Antiemetics • Antidiarrheals	2	1
E. Endocrine system drugs • Pituitary hormones	2	0

• Adrenal corticosteroids • Thyroid medications • Diabetes medications		
F. Reproductive system drugs • Hormones • Erectile dysfunction medications	2	0
G. Cardiovascular drugs • Cardiac glycosides • Antiarrhythmic medications • Antihypertensives • Coronary vasodilators • Antilipemic medications • Vasoconstrictors • Anticoagulants • Platelet inhibitor therapy	2	1
H. Respiratory system drugs • Oxygen • Bronchodilators • Corticosteroids • Mucolytics and expectorants • Antihistamines • Decongestants	2	1
Ⅱ. Musculoskeletal drugs • Skeletal muscle relaxants • Osteoporosis therapy • Injectable steroids	2	0
VI. Antipyretic	2	0
VII. Anti-inflammatory drugs	2	0
VIII. Fluid and electrolyte replacements	2	0
IX. Anxiety, phobia and conscious sedation • Agents for conscious sedation • Barbiturates • Benzodiazepines • Opiate analgesics	3	0
X. Pharmacology of Emergency • Introduction • Cardiorespiratory arrest • Emergency medication of cardiorespiratory arrest • Other cardiac medications	2	0
Total	**45**	**09**

Recommended Books:

- Pharmacology and Drug Administration for Imaging Technologists 2nd Edition.
- Lippincott's pharmacology (text book) 2nd edition published by Lippincott Raven

MEDICINE
Credit hours 3 (3+0)

COURSE OBJECTIVES:

By the end of this course student will be able to describe different medical conditions system wise, their signs, symptoms, and general description of diseases and role of Medical Imaging, Indications and contraindications for different radiological Procedures.

Course content	MCQs	SEQs
I. DISEASES OF THE CARDIOVASCULAR SYSTEM: • Investigation of the cardiovascular disease. • ECG • Heart failure. • Hypertension. • Cardiac arrest. • Myocardial ischaemia. • Myocardial infarction. • Mitral valve disease. • Aortic valve disease. • Tricuspid valve disease. • Pulmonary valve disease. • Persistent ductus arteriosis. • Coarctation of the aorta. • Arterial septal defect. • Ventricular septal defect. • Tetralogy of fallot. • Cardiac tumours.	07	01
II. DISEASES OF THE NERVOUS SYSTEM. • Investigation of the respiratory disease. • The solitary radiographic pulmonary lesion. • Pneumonia. • Tuberculosis. • X Ray findings of common diseases caused by organic and inorganic dusts. • Primary & Secondary tumors of the lungs. • Tumors of the mediastinum. • Diseases of the pleura. • Deformities of the chest wall.	07	01
III. DISEASES OF THE JOINTS AND BONES. • Investigation of the renal disease. • Cystic kidney disease. • Obstruction of the urinary tract. • Urinary tract calculi and nephrocalcinosis. • Tumours of the renal pelvis, kidney, ureter and bladder • Prostatic disease. • Testicular tumors.	07	02

IV. DISEASES OF THE LIVER AND BILIARY SYSTEM. • Imaging Investigation of the endocrine disease. • Hypothyroidism and Hyperthyroidism. • Simple goiter. • Solitary thyroid nodule. • Malignant tumours.	07	01
V. DISEASES OF THE ALIMENTARY TRACT. • Investigation of gastrointestinal disease. • Dysphagia. Dyspepsia. Vomiting. • Gastro-oesophageal reflux disease. • Tumours of the oesophagus. • Perforation of the oesophagus. • Peptic ulcer disease. • Tumours of the stomach and small intestine. • Tumours of the pancreas.	05	01
VI. ENDOCRINE DISEASES • Investigation of the hepatobiliary disease. • Portal hypertension, Ascites. • Hepatomeagaly • Splenomegaly • Tumours of the liver. • Liver abscess, Hepatic nodules. • Fibropolystic disease. • Gallstones and Cholecystitis. • Tumours of the gallbladder and the bile duct.	04	01
VII. DISEASES OF THE KIDNEY AND URINARY SYSTEM. • Investigations of bone and joints diseases. • Low back pain. • Neck pain. • Joint pains • Osteoarthritis and related disorders. • Rheumatoid arthritis and Juvenile idiopathic arthritis. • Infective arthritis. • Osteoporosis. • Osteogenesis imperfecta. • Osteomalacia and rickets. • Paget's disease. • Cancer-associated bone disease.	04	01
VIII. DISEASES OF THE RESPIRATORY SYSTEM • Investigation of neurological disease. • Disturbances of the visual system. • Cerebrovascular disease. • Disorders of the spine and spinal cord. • Meningitis.	04	01

• Intracranial neoplasm. • Paraneoplastic neurological disease. • Hydrocephalus.		
Total	**45**	**09**

RECOMMENDED BOOK:

- Practice of Medicine by Davidson
- Practice of Medicine by Inaam Danish
- Bedside techniques methods of clinical examination. 4th Edition by Muhammad. Inayatullah

Allied Health Sciences

Curricula 2024

BS MEDICAL LABORATORY TECHNOLOGY

CURRICULUM

SCHEME OF STUDIES

SEMESTER	COURSE CODE	COURSE TITLE	THEORY	PRACTICAL	CREDIT HOURS
1st Semester	GEFE	Functional English	03	00	03
	GEQR	Quantitative Reasoning-I	03	00	03
	GENS	Natural Sciences	02	01	03
	GEAH	Arts and Humanities	02	00	02
	GEICP	Ideology and Constitution of Pakistan	02	00	02
	IDC	Basic Biochemistry	03	00	03
	PERL-I	PERL-I	01	00	01
Total Credit Hours					**17**
2nd Semester	GEEW	Expository Writing	03	00	03
	GEQR	Quantitative Reasoning-II	03	00	03
	GESS	Social Sciences	02	00	02
	GEIE	Islamic Studies/Ethics	02	00	02
	BAN	Basic Anatomy	03	00	03
	BPH	Basic Physiology	03	00	03
	BLI	Basic Lab instrumentation	02	01	03
	PERL-II	PERL-II	01	00	01
Total Credit Hours					**20**
3rd Semester	GEE	Entrepreneurship	02	00	02
	GECCM	Civics and Community Engagement	02	00	02
	GEICT	Applications of Information and Communication Technologies	02	01	03
	GPA	Gen Pathology	03	00	03
	HP-I	Histopathology -I	03	01	04
	HM-I	Hematology-I	03	01	04
	EPC-1	English Proficiency 1	02	00	02
	PERL-III	PERL-III	01	00	01
Total Credit Hours					**21**
4th Semester	HP-II	Histopathology -II	03	01	04
	HM-II	Hematology-II	03	01	04
	Mic-I	Microbiology -1 Basic Bacteriology	02	01	03
	CP-I	Chemical Pathology-I	03	01	04
	BMB	Basic Molecular Biology	02	00	02
	PS	Pakistan Studies	02	00	02
	EPC-2	English Proficiency 2	02	00	02

	PERL-IV	PERL-IV	01	00	01
Total Credit Hours					**20**
5th Semester	HP-III	Histopathology III	02	02	04
	HM-III	Hematology III	03	01	04
	Mic-II	Microbiology II	02	01	03
	CP-II	Chemical Pathology II	03	01	04
	BIS	Basic Immunology and Serology	02	01	03
	EPC-3	English Proficiency 3	02	00	02
	PERL-V	PERL-V	01	00	01
Total Credit Hours					**21**
6th Semester	Mic-III	Microbiology-III	02	01	03
	CP-III	Chemical Pathology III	03	01	04
	MBG	Molecular Biology and Genetics	03	01	04
	BB	Blood Banking (Transfusion Medicine)	02	01	03
	AI	Advance Immunology	02	01	03
	EPC-4	English Proficiency 4	02	00	02
	PERL-VI	PERL-VI	01	00	01
Total Credit Hours					**20**
7th Semester	Mic-IV	Microbiology IV	02	1	03
	MPC	Molecular Pathology and Cytogenetics	03	1	04
	Ent	Entrepreneurship	02	0	02
	BS	Biostatistics	03	0	03
	InFE	Internship/Field Experience	03	0	03
	EPC-4	English Proficiency 4	02	0	02
	PERLVI	PERL-VI	01	0	01
Total Credit Hours					**18**
8th Semester	QCA	Quality control and Accreditation	03	0	03
	RM	Research Methodology	03	0	03
	BRM	Biosafety and Risk management	02	01	03
	CP	Capstone Project	0	03	03
	EPC-4	English Proficiency 4	02	0	02
	PERLVI	PERL-VI	01	0	01
Total Credit Hours					**15**

HISTOPATHOLOGY – I

Credit Hour: 4(3+1)

Objectives/Outcomes:

- To understand the basic techniques in histopathology
- To understand the work flow in histopathology Lab
- To know the purpose of different instruments with their basic working principles
- To understand the importance and the usage of commonly employed histopathological instruments

Course Contents:

List of Topics	MCQs	SEQs
I. Microscopy • Brief history of Microscopy • Basic principle, Types, classification (Simple, Compound, florescent, Electron microscopes) & their uses • Handling and working of microscope • Care, Cleaning & Quality Control of Microscope.	10	02
II. Introduction to common histological Techniques: • Reception of histopathological specimens • Examination of received samples	05	01
III. **Fixation** • The purpose of fixation • Different methods of fixation • Commonly used fixatives; Formaldehyde, Glutaraldehyde, Alcohol Based Fixatives, Osmium tetra oxide fixative, Zenkers' Solution. • Factors effects the quality of fixation • Quality control of fixatives and fixation	05	01
IV. Grossing • Biopsy & type of biopsies (Core Biopsies, Skin Biopsies, Needle biopsies, Image-guided biopsy, Surgical (excisional) biopsy, Shave biopsy/punch biopsy, Endoscopic biopsy, Laparoscopic biopsy, Bone marrow aspiration and biopsy, Liquid biopsy). • Merit & Demerits of different type of biopsies • Grossing Protocols • Decalcification of bones/ hard tissues	10	2
V. **Tissue Processing** • Purpose and principle of Tissue Processing • Manual & Automated Tissue Processing (Principal of different automated tissue processors) • Stages of Tissue Processing • Different fixatives, dehydrating & Clearing agents used in it. • Advantages and disadvantages of manual & Automated Tissue Processing	10	02

• Maintenance and Quality Control of Tissue Processing & Processors		
VI. **Embedding** • Principle of embedding • Manual & Automated Embedding Techniques • Types of different embedding medias • Orientation of Tissues • Quality Control of Paraffin embedding • Properties of paraffin and other embedding	05	01

List of Practical:	**OSPEs**
I. **Microscope** • **Fixation** • Principle, handling of fixatives used for histopathological specimen**,** QC • Preparation of 10% formalin **I. Grossing** • Protocols for receival of specimen and record keeping. • Grossing Protocols • Decalcification of bones/ hard tissues **II. Tissue Processing** • Manual & Automated Tissue Processing (Principal of different automated tissue processors) • Steps of Tissue Processing • Maintenance and Quality Control of Tissue Processing & Processors **III. Embedding** • Manual & Automated Embedding Techniques • Orientation of Tissues • Quality Control of Paraffin embedding	03

Recommended Books:

1. Carton, J. 2012. Oxford Handbook of Clinical Pathology, 1st ed. Oxford University Press, New York, U.S.A.
2. Kumar, V., A.K. Abbas, N. Fausto, and J.C. Aster. 2015. Robbins and Cotran Pathologic Basis of Disease, 9th ed. Saunders Elsevier, USA.
3. Hammer, G.D. and McPhee, S.J. 2014. Pathophysiology of Disease: An Introduction to Clinical Medicine, 7th ed. McGraw-Hill Education, Bew York, USA.

HISTOPATHOLOGY – II

Credit Hour 4 (3+1)

Objectives:

- To understand the basics and uses of microtome in histopathology
- To know the different precision cutting instruments in histopathology lab
- To know different types of microtome, their basic principle and uses
- To understand the basics of stains used in histopathology
- To know different stains used, their purpose and interpretation

Course outline

List of Topics	MCQs	SEQs
I. **Microtomy** • Principle of Microtomy • Types of Microtomes • Microtome knives • Sectioning Protocols (Setting of microtome for cutting of different tissues with different width, commonly used) • Advantages & Disadvantages of different microtome knives • The Freezing methods of sectioning (Principle, Specifications, Advantages, Disadvantages, Cutting with freezing microtomes, Maintenance of Freezing Microtomes) • Maintenance and Quality Control of Microtome & Microtomy.	10	03
II. **Tools Used along with Microtomy** • Floating bath (Maintenance) • Slide drying & Hot Plate • Brushes • Slides with Adhesives & type of adhesives	10	02
III. **Stains** • Principle of staining • Types of stains • Preparation of various stains • Automated & Manual Staining Protocols • Interpretation of different stains • Quality Control of Staining • Routine H & E Staining • GMS stain, Mucicarmine and Alcian Blue Stain • Mallory's connective tissue stain • Aldehyde fuchsin and Verhoff's stain for elastic fibers • Reticulin stain • Toluidine blue staining for mast cells • Von-Geison, Masson's Trichome stain • Nissel stain, Stains of Myelin • Sudan black B	15	03

• Oil Red O Stain • GFAP for Glial Cells • Stains for demonstration of Calcium, Iron, Melanin, Muscle Tissue PTAH, Amyloid material, Mucinous material • The PAS technique, PAS diastase technique		
IV. Mounting • Purpose of mounting • Different Mounting Media used for mounting • Automated and Manual mounting protocols • Quality Assurance	10	02

Practical:

List of Practicals:	No. of OSPEs
I. Microtome (principle, maintenance, working and QC) **II.** staining procedures • Protocols for different stains and interpretation • Quality control of stains • Trouble shootings **III.** Mounting (principle, maintenance, working and QC) **IV.** Embedding (principle, maintenance, working and QC)	03

Recommended Books:

1. Carton, J. 2012. Oxford Handbook of Clinical Pathology, 1st ed. Oxford University Press, New York, USA.
2. Hammer, G.D. and McPhee, S.J. 2014. Pathophysiology of Disease: An Introduction to Clinical Medicine, 7th ed. McGraw-Hill Education, Bew York, USA.

HEMATOLOGY I

Credit Hour 4 (3+1)

Basic hematological techniques/Red Blood Cells and anemias

Learning Outcomes/Objectives:

- To relate different factors and stages of hematopoiesis
- To interpret red cell indices in relation to different types of anemias
- To understand the complete instrumentation and Quality practices in hematology laboratory

Course Content:

List of Topics	MCQs	SEQs
I. Hematopoiesis • Site of Hematopoiesis • Factors which govern hematopoiesis • Maturation of erythrocyte	02	
II. Hemoglobin Synthesis and function • Metabolism • Normal red cell indices • Different shapes of RBC's • Different red cell inclusions	02	
III. Microcytic Hypochromic Anemias • Iron Deficiency Anemia • Nutritional and metabolic aspects of iron • Iron absorption • Iron deficiency • Causes of iron deficiency • Laboratory findings • Anemia of chronic disorders • Sideroblastic anemia	03	01
IV. Macrocytic Anemias • Metabolism of Vitamin B 12 Folate • Vitamin B 12 deficiency • Folate deficiency • Clinical features of megaloblastic anemia • Diagnosis of vitamin B 12 or folate deficiency	03	01
V. Hemolytic Anemias • Normal red cell destruction • Introduction to hemolytic anemias • Intravascular and extravascular hemolysis	02	
VI. Hereditary Hemolytic Anemias • Hemoglobinopathies (Thalassemias, Sickle cell anemia) • Membranopathies (Hereditary spherocytosis),	07	02

• Enzymopathies (G6PD Deficiency) VII. Acquired Hemolytic Anemias • Immune Hemolytic Anemia • Microangiopathic Hemolytic Anemia		
VIII. Stains • Preparation, Principle, Procedure, Interpretation and Clinical Significance of ➢ Field's ➢ Giemsa ➢ Retics ➢ Prussian Blue	03	01
IX. Hb Estimation Methods ● Principle ● Procedure	01	
X. Hematology Analyzers ● Types ● Principle ● Maintenance ● Quality Control	02	
XI. Erythrocyte Count by Hemocytometer ● General principles ● Method ● Sources of error	02	
XII. Reticulocyte Count ● Preparation ● Principle ● Procedure ● Normal values ● Interpretation	02	
XIII. Erythrocyte Sedimentation Rate ● Principle ● Method ● Normal Values ● Interpretation ● Significance	02	
XIV. Osmotic Fragility Test ● Principle ● Method ● Normal Values ● Interpretation ● Significance ● Interpretation XV. Sickle cell Studies ● Principle ● Method ● Interpretation ● Significance	03	01

XVI. Hb Electrophoresis and HPLC ● Principle ● Method XVII. Blood Parasites ● Staining ● Morphology ● Interpretation	03	01
XVIII. Collection and handling of blood samples ● Intravenous, Arterial, Capillary Sampling, Patient Preparation, Patient handling before and after sampling ● Vacutainers and anticoagulants used in them	04	01
XIX. Quality Assurance in Hematology ● Preanalytical, Analytical and Post analytical methods and errors	04	01

Practical:

List of Practical	**No of OSPEs**
I. Peripheral Smears • Preparation, Drying, Fixation & Staining Procedure • Criteria for good Smear II. Staining procedures • Field's • Giemsa • Retics • Prussian Blue III. Working of Hematology Analyzers, Neubauer chamber ● Principle ● Diluting Fluid ● Counting method ● Quality control IV. Erythrocyte Count by Hemocytometer V. Method of Erythrocyte Sedimentation Rate VI. Method of Osmotic Fragility Test VII. Sickling Test VIII. Collection and handling of blood sample	03

Recommended Instructional / Reading Materials:

1. Hoffbrand's Essential Haematology, Seventh Edition
2. Dacie and Lewis Practical Hematology, Twelfth addition
3. District-laboratory-practice-in-tropical-countries monica-chees brough
4. Manual of Laboratory medicine – AFIP

HEMATOLOGY II
White blood cells and related disorders

Credit Hour 4(3+1)

Objectives

- To understand the functions, clinical significance and diseases of White Blood Cells

Course Outline:

List of Topics	MCQs	SEQs
I. Leucopoiesis • Maturation of Granulocytic series • Maturation of Lymphocytic series • Maturation of Monocytic Series • Differential Leucocyte Count	03	01
II. Reference range of Leucocytes • Percentage and absolute counts	02	
III. Benign disorders of leucopoiesis • Leukocytosis, Neutrophilia, Monocytosis, Lymphocytosis, Eosinophilia	03	01
IV. Leucopenia	01	
V. Spleen – Causes of splenomegaly and hyposplenism	03	01
VI. Acute Leukemias • WHO Classification • Peripheral and bone marrow findings • Special stains and their interpretation • Flowcytometry and its interpretation • Cytogenetics and molecular genetics	10	02
VII. Myeloproliferative Disorders • WHO Classification • Peripheral and bone marrow findings • Special stains and their interpretation • Cytogenetics and molecular genetics	10	01
VIII. **Non-Hodgkins Lymphoma** **WHO Classification** **Diagnosis of Chronic lymphocytic leukemia** **Multiple Myeloma**	05	01
IX. Classification & Diagnosis of Hodgkins Lymphoma	02	01

• Special stains, Preparation, principle, procedure, significance of ➢ Sudan Black B ➢ Myeloperoxidase stain ➢ PAS ➢ Esterases ➢ Leucocyte Alkaline Phosphatase (Scoring)	05	01
X. LE cell phenomena	01	

Practical

List of Practical	**No of OSPEs**
I. WBC count by Neubauer chamber **II. Identification of Neutrophils, Lymphocytes, Monocytes and Eosinophils** **III. Procedure of Bone marrow biopsy** **IV. Staining methods for** • Sudan Black B • Myeloperoxidase stain • PAS • Esterases • Leucocyte Alkaline Phosphatase (Scoring)	03

Recommended Books:

1. Hoffbrand's Essential Haematology, Seventh Edition
2. Dacie and Lewis Practical Hematology, Twelfth addition
3. District-laboratory-practice-in-tropical-countries monica-chees brough
4. Manual of Laboratory Medicine – AFIP

MICROBIOLOGY-I

(BASIC BACTERIOLOGY & VIROLOGY)

Credit Hour 4(3-1)

Objective/Learning outcomes:

- To understand the basic structure, function and impact on host of infectious agents
- To understand the basic structure & function of bacteria & Viruses
- To unde4rstand the pathogenesis of clinically important viruses

Course Outline:

TOS of Microbiology -1 (Basic Bacteriology & Virology)

Course Outline:	**`MCQs**	**SEQs**
I. General/ Basic Bacteriology		
• Structure of bacterial cell & Significance of bacterial spores.	04	01
• Classification of bacteria • Growth of bacterial cell	04	01
• Genetics of bacteria & transfer of genetic material from one bacterium to another	04	01
• Pathogenesis of Bacteria (Principle, important terms, Stage of bacterial pathogenesis & disease development)	07	01
• Toxin Production (Mechanism of action) • Laboratory Diagnosis (General approaches to diagnose the infection, Bacteriological methods)	03	01
• Bacterial Vaccines	03	01
• Sterilization & Disinfection (Principles, Physical & Chemical methods of sterilization)	10	01
II. **Virology** • Classification, General structure, Pathogenesis and replication of Viruses • Cytopathic effects of virus effected cells	10	02
Total	45	9

Practical	(No. of OSPE)
• Biosafety Levels & Biosecurity • Biosafety Cabinets & Types • Essential elements in diagnostic microbiology lab • Staining techniques for bacterial morphology identification • Microscopic techniques • Culture media, types preparation & Culturing Techniques • All biochemical tests used in microbiology lab (Principle, Mechanism & Interpretation) • Diagnostic tests for different viruses • Basics of Culturing of viruses • Automation in Culturing	03

Recommended Books:

- Levinson Microbiology Latest Edition
- District-laboratory-practice-in-tropical-countriespart-2 monica-chees brough
- Medical Microbiology by Jaypee

CHEMICAL PATHOLOGY – I

Credit Hour 4(3+1)

(Basic Techniques + Biohazards +Q.C +Lab Management)

Objectives/Outcome:

- To learn and practice Basic Concepts of Laboratory Working
- To learn Lab Hazards and Safety Procedures.

Course Contents:

List of Topics	MCQs	SEQs
1. Basic Techniques Chemical Hazards, Biohazards, Electric Hazards and safety guidelines, procedures **Reagent Grade Water** Types & uses of Reagent Grade Water. Methods for preparing reagent grade water. **General Laboratory Techniques** • SI Units, conversion factors from old system of units to SI Units, Reporting of lab results with references ranges. • Principles, Components, Operation and Maintenance of Basic Laboratory Equipment including Pipets, Burets, automatic pipettes, balances, water bath, Incubators, deionizer and distillation plant. • Operation, components, types & maintenance of Centrifuges	**12**	**2**
2. **Specimen Collection and Handling** ● Sample collection, Identification, Handling, Safe transportation, ● & Processing, ● Disposal of Specimen of blood & various body fluids, ● Types of Vacuum tubes used for phlebotomy, effects of anticoagulants, ● Physiological and biological factors affecting the analytes. ● Identification of sources of preanalytical, Analytical and Post analytical errors.	10	1
3. **Basic Laboratory Techniques and Instrumentation** Basic Principals, operation & functions of ● Spectrophotometer, Fluorimeter, nephelometer, turbidimeter, ● Electrolyte analyzer, Blood Gas Analyser, ● Types of Fully Automatic Chemistry Analyser ● Fully Automatic Chemiluminescence base Special Chemistry Analyser ● Electrophoresis, ● Radio-immunoassays, ● ELIZA and PCR.	12	3
4. **Quality Control and Reference Ranges** • Basic concept & application of Internal & External Quality Control Programs,	6	2

• Explanations of terms used in QC e.g. Accuracy, precision, specificity & sensitivity • Procedures to assess QC e.g. Levy-Jenning charts. • Application & significance of Westgard's rules • Advantages and disadvantages of various control materials • Basic concept of reference ranges and their use in reporting		
5. Lab Management • Basic concepts about day to day working in Laboratory. • Preparation of Job description and Standard Operating Procedure (SOP) of different steps of Lab workflow • Selection of instruments/Kits and Reagents. • Management of troubleshooting of all equipment and risk management. • Basic knowledge & application regarding certification and accreditation Programs. Preparation of standard operating procedures for ISO certification, ISO 15189 and Government Authorities.	5	1

Practical:

List of Practical	No of OSPEs
• Handling of Blood/ Serum samples for the analysis of different chemicals • Safety practices for the handling of electric instruments used in laboratory • Units understanding, conversion & reference ranges • Phlebotomy practice in routine (Clinical rotation to phlebotomy section and understanding about the SOPs and protocols of taking venipuncture, capillary puncture & arterial puncture. Use of anticoagulants. • Principle & Calibration, Uses and maintenance of Spectrophotometer Fluorometer, nephelometer, turbidimeter, Electrolyte Analyser. • Principle, Calibration, Uses and maintenance of ELISA plate reader and washer. • Drawing of LJ Chart and applications of West-guard rules • SOP Preparation	**3**

Reference Books

1. Clinical Chemistry by Michael Bishop 8th Edition.
2. Chemical Pathology for Beginners by Amir Ijaz.
3. Manual of Laboratory Medicine 7th Edition A Publication of Armed Forces Institute of Pathology Rawalpindi-Pakistan.
4. The Good Clinical Laboratory Practices in Pakistan by Pakistan academy of Sciences (2019).
5. District Laboratory Practices in Tropical Countries, Monica Cheesebrough.

BASIC MOLECULAR BIOLOGY & GENETICS
Credit Hours 2 (2+0)

Objectives/ outcomes:

- To Know about basics of molecular genetics and how DNA and RNA work
- To understand central dogma of molecular biology and details of DNA replication, Transcription and Translation
- To understand how expression of genetic information is regulated
- Recognize the comparison of prokaryotic and eukaryotic genes and genomes.
- To understand the basis of human genetics, transfer and impact of changes of genetic material in human

Topic	MCQs	SEQs
I. Nucleic Acids and Proteins • DNA • DNA STRUCTURE • Nucleotides • Nucleic Acid • DNA REPLICATION • RNA • Transcription • TYPES/STRUCTURES OF RNA • PROTEINS AND THE GENETIC CODE • Amino Acids • Genes • The Genetic Code • TRANSLATION • Amino Acid Charging • Protein Synthesis	10	2
II. **Gene Expression and Epigenetics** • TRANSCRIPTION • REGULATION OF TRANSCRIPTION • Regulation of Messenger RNA Synthesis at Initiation • Post-Transcriptional Regulation • Post-Translational Regulation	10	2
III. Chromosomal Structure • CHROMOSOMAL STRUCTURE AND ANALYSIS • Chromosome Morphology • Visualizing Chromosomes	5	1
IV. BASIC PRINCIPLES OF INHERITANCE AND MENDELIAN GENETICS • Heredity and variation • Chromosomal theory of inheritance • Mitochondrial genes, inheritance and disorders	5	1

• Genetic linkage		

RECOMMENDED BOOKS:

1. Lela Buckingham. Molecular Diagnostics: Fundamentals, Methods, and Clinical Applications, 3rd Edition.
2. Riki Lewis, Human Genetics Concepts and Applications-12th Edition
3. Molecular Biology of the Gene, Games Watson 7th edition.

Allied Health Sciences

Curricula 2024

BS NUTRITION CURRICULUM

SCHEME OF STUDIES

SEMESTER	COURSE CODE	COURSE TITLE	THEORY	PRACTICAL	CREDIT HOURS
1st Semester	GEFE	Functional English	03	00	03
	GEQR	Quantitative Reasoning-I	03	00	03
	GENS	Natural Sciences	02	01	03
	GEAH	Arts and Humanities	02	00	02
	GEICP	Ideology and Constitution of Pakistan	02	00	02
	IDC	Basic Biochemistry	03	00	03
	PERL-I	PERL-I	01	00	01
Total Credit Hours					**17**
2nd Semester	GEEW	Expository Writing	03	0	03
	GEQR	Quantitative Reasoning-II	03	0	03
	GESS	Social Sciences	02	0	02
	GEIE	Islamic Studies/Ethics	02	0	02
	IDC	Basic Anatomy	03	0	03
	IDC	Basic Physiology	03	0	03
	PERL-II	PERL-II	01	0	01
Total Credit Hours					**17**
3rd Semester	GEE	Entrepreneurship	02	00	02
	GECCM	Citizenship Education and Community Engagement	02	00	02
	GEICT	Applications of Information and Communication Technologies (ICT)	02	01	03
	IDC	General Pathology	03	00	03
	MFHN	Fundamentals of Human Nutrition	03	00	03
	MFST	Introduction to Food Science and Technology	02	01	03
	MMA	Macronutrients in Human Nutrition	03	00	03
	EPC-1	English Proficiency-1	02	00	02
	PERL-III	PERL-III	01	00	01
Total Credit Hours					**22**

4th Semester	MFM	Food Microbiology	02	01	03
	MMI	Micronutrients in Human Nutrition	03	00	03
	MPNA	Principles of Nutritional Assessment	02	01	03
	MNL	Nutrition through Lifecycle	03	00	03
	MFSM	Fundamentals of Food Service Management	02	01	03
	PS	Pakistan Studies	02	0	02
	EPC-2	English Proficiency-2	02	0	02
	PERL-IV	PERL-IV	01	0	01
Total Credit Hours					**20**
5th Semester	MFFN	Functional Foods & Nutraceutical	02	01	03
	MCN-I	Clinical Nutrition-I	02	01	03
	MHD	Hospital Dietetics	02	01	03
	MNI	Nutritional Immunology	03	00	03
	MNT-I	Medical Nutrition Therapy-I	02	01	03
	MDNI	Drug Nutrient Interaction	03	00	03
	EPC-3	English Proficiency-3	02	00	02
	PERL-V	PERL-V	01	00	01
Total Credit Hours					**21**
6th Semester	EL-1	Elective 1	03	00	03
	MCN-II	Clinical Nutrition – II	02	01	03
	MRMN	Research Methodology in Nutrition	02	01	03
	EL-2	Elective 2	03	00	03
	MNT-II	Medical Nutrition Therapy- II	02	01	03
	MCASN	Clinical Aspects of Sports Nutrition	03	00	03
	EPC-4	English Proficiency-4	02	00	02
	PERL-VI	PERL-VI	01	00	01
Total Credit Hours					**21**
7th Semester	MFLR	Food laws & Regulations	03	00	03
	MNPCC	Nutritional Practices in Critical Care	02	01	03

	MBNP	Basics of Nutrigenomics and Proteomics	02	01	03
	MRAND	Recent Advances in Nutrition & dietetics	02	01	03
	MNCS	Nutritional Counselling Skills	02	01	03
	INT	Internship/Field Experience	03	00	03
	EPC-5	English Proficiency-5	02	00	02
	PERL-VII	PERL-VII	01	00	01
Total Credit Hours					**21**
8th Semester	MPHN	Public Health Nutrition	03	00	03
	MBND	Biotechnology in Nutrition and Dietetics	02	01	03
	MNP	Nutrition and Psychology	03	00	03
	MFTA	Food Toxicology and Additives	02	01	03
	EPC-6	English Proficiency-6	02	00	02
	PERL-VIII	PERL-VIII	01	00	01
	CAP	Cap-stone Project	03		03
Total Credit Hours					**21**

FUNDAMENTALS OF HUMAN NUTRITION

Credits: 3 (3+0) Cr. Hrs

Learning outcomes:

1. To Understand macronutrients and micronutrients:
2. To assess dietary requirements based on individual factors
3. To Recognize nutrition's impact on health and diseases
4. To Interpret dietary guidelines and recommendations
5. To Identify food sources and read food labels
6. To Address nutrition needs across different life stages

Content		MCQs	SEQS
I.	Introduction: food, nutrients nutrition	3	1
II.	Malnutrition - global and local scenario diet	4	0.5
III.	Balanced diet	4	0.5
IV.	Food groups	4	1
V.	Foundations of healthy diet,	4	1
VI.	Meal planning; Water: functions, regulation in body,	4	1
VII.	Dietary requirements	3	0.5
VIII.	Electrolytes and acid-base balance	3	0.5
IX.	Carbohydrates: types, role in body, dietary fiber, bulk and alternative sweeteners, recommended intake and energy value	8	1
X.	Fats and oils: types, functions, recommendations concerning fat intake, fat substitutes.	8	1
Total		**45**	**9**

Recommended books:

1. Awan, J.A. 2011. Elements of Food and Nutrition. Unitech Communications, Faisalabad,Pakistan.
2. Bamji, M.S., K. Krishnaswamy and G.N.V. Brahmam. 2009. Textbook of Human Nutrition,3rd ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India.
3. Eastwood, M. 2013. Principles of Human Nutrition. Springer US.
4. Geissler, C. and H. Powers. 2011. Human Nutrition, 12th ed. Churchill Livingstone, London,UK.
5. Krause's Food & the Nutrition Care Process 14th Edition by L. Kathleen Mahan MS RD CDE 16 edition

INTRODUCTION TO FOOD SCIENCE AND TECHNOLOGY

Credit Hours: 3 (2+1)

Learning Outcomes

1. To Understand the basic principles and concepts of food science and technology.
2. To Learn about the various components of food and their roles in food quality and safety.
3. To Gain knowledge of food processing techniques and technologies used in the food industry.
4. To Learn about food safety and sanitation standards in food processing and handling.
5. To Explore food packaging and its importance in maintaining food quality and safety.
6. To Understand the basics of food engineering and its application in food processing.
7. To Develop an appreciation for the sustainability and ethical considerations in food production and technology

Course Content:	MCQs	SEQs
I. Introduction to Food Science and Technology • Overview of the course, objectives, and importance. • Historical perspectives and the evolution of food science and technology. • Food safety and quality assurance.	**3**	**0.5**
II. Food Composition and Analysis • Components of food: macronutrients and micronutrients. • Techniques for food analysis and testing. • Food labeling and nutritional analysis.	**3**	**0.5**
III. Food Processing and Preservation • Principles of food processing methods: thermal processing, freezing, drying, etc. • Food preservation techniques: canning, pasteurization, refrigeration, and modern methods. • Impact of processing on nutrient content and bioavailability.	**3**	**0.5**
IV. Food Packaging • Role of packaging in food preservation and quality maintenance. • Types of food packaging materials and their properties. • Environmental considerations in food packaging.	**3**	**0.5**
V. Food Sensory Evaluation • The science of taste, flavor, and texture. • Sensory analysis techniques and their applications. • Consumer perception of food quality.	**3**	**0.5**
VI. Food Quality and Shelf Life • Factors affecting food quality and shelf life. • Determining shelf life through chemical, physical, and	**3**	**1**

sensory methods. • Strategies for extending shelf life.		
VII. Food Product Development • Steps in food product development. • Consumer trends and market research. • Developing functional foods and new food products.	**3**	**0.5**
VIII. Food and Health • Nutritional aspects of processed and convenience foods. • Food technology's role in addressing malnutrition and dietary needs. • Functional foods and their health benefits.	**3**	**0.5**
IX. Emerging Trends in Food Science and Technology • Advances in food technology: nanotechnology, biotechnology, and 3D printing. • Sustainable food production and alternative protein sources. • Food waste reduction and upcycling.	**3**	**0.5**
X. Food Safety Management • Principles of Hazard Analysis and Critical Control Points (HACCP). • Food safety management systems and certification.	**1**	**0.5**
XI. Food Ethics and Sustainability • Ethical considerations in food production, distribution, and consumption. • Sustainable food practices and their impact on the environment.	**2**	**0.5**
Total	**30**	**6**

List of Practical	No. of OSPEs
1. Use of basic Food laboratory equipment's	**1**
2. Estimation of moisture, fat, protein, carbohydrates, fiber and ash in Food samples	**1**
3. Determination of soluble solids, total solids, pH, acidity, total sugars, specific gravity, refractive index and peroxide value	**1**

Suggested Instructional / Reading Materials

1. Potter, N.N. and Hotchkiss, J.H. 2007. Food science. The AVI Pub. Co. Inc., Westport, Connecticut,USA.
2. M. Shafi ur Rahman. 2007. Handbook of Food Preservation. 2nd Edition. CRC Press Taylor &Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742.
3. Anilkumar G. Gaonkar.2007. Food Processing: Recent Developments. Academic Press

is animprint of Elsevier 30 Corporate Drive, Suite 400, Burlington, MA 01803, USA.
4. Awan, J.A. 2005. Food Science and Technology. Unitech Communications, Faisalabad- Pakistan.
5. Robert L. Shewfelt, Alicia Orta-Ramirez, Andrew D. Clarke (eds) .2015. Introducing Food Science,Second
6. Edition. CRC Press

MACRONUTRIENTS IN HUMAN NUTRITION

Credits Hours : 3 (3+0)

Learning Outcomes

1. To Understand and define macronutrients (carbohydrates, proteins, fats).
2. To Learn sources and functions of each macronutrient.
3. To Comprehend digestion, absorption, and metabolism of macronutrients.
4. To Explore the concept of energy balance and its relevance to macronutrient intake.
5. To Understand macronutrient requirements based on various factors.
6. To Recognize metabolic disorders related to macronutrient imbalances.
7. To Learn to plan a balanced diet incorporating appropriate macronutrient ratios.
8. To Understand the impact of macronutrients on public health and policies.

Course Content:	MCQs	SEQs
1: Introduction to Macronutrients • Overview of macronutrients: carbohydrates, proteins, and fats. • Role of macronutrients in providing energy and maintaining health. • Macronutrients in the context of a balanced diet.	**3**	**1**
2: Carbohydrates • Types of carbohydrates: simple sugars (monosaccharides), complex carbohydrates (polysaccharides). • Dietary sources of carbohydrates. • Carbohydrates' role in energy production, fiber, and glycemic index. • Recommended daily intake and the impact on health.	**6**	**1**
3: Proteins • Amino acids: the building blocks of proteins. • Sources of dietary protein: animal and plant based. • Protein's role in tissue growth, repair, and overall health. • Protein quality, essential vs. non-essential amino acids, and recommended daily intake.	**6**	**1**
4: Fats • Types of dietary fats: saturated, unsaturated (monounsaturated and polyunsaturated), and trans fats. • Dietary sources of fats. • Fats' role in energy storage, cell structure, and metabolic functions. • Recommended daily intake and the impact on health.	**6**	**1**
5: Digestion and Metabolism of Macronutrients • Digestive processes for carbohydrates, proteins, and fats. • Absorption and transport of macronutrients in the body. • How macronutrients are metabolized for energy production and storage.	**5**	**1**
6: Macronutrients and Energy Balance • The concept of energy balance: calories in vs. calories out. • How macronutrients contribute to energy balance. • The role of macronutrients in weight management and body	**5**	**1**

composition.		
7: Macronutrients and Health • The influence of macronutrients on chronic diseases (e.g., heart disease, diabetes, cancer, obesity, stroke, arthritis). • Dietary recommendations for managing health conditions through macronutrient intake.	**5**	**1**
8: Special Dietary Considerations • Macronutrients in specific diets (e.g., low-carb, high-protein, vegetarian, ketogenic). • Nutritional requirements during pregnancy, lactation, childhood, and old age. • Dietary considerations for athletes and individuals with specific health conditions.	**4**	**1**
9: Practical Applications and Meal Planning • Meal planning for a balanced diet. • Analyzing the macronutrient content of different foods.	**5**	**1**
Total	**45**	**9**

Suggested Instructional / Reading Materials

1. Advanced Nutrition by Carolyn D. Berdanier, Janos Zempleni Page 224-226
2. Biochemical and Physiological aspects of human nutrition by Martha H. Stipanuk Page 101-105
3. Krause's Food & the Nutrition Care Process 14th Edition by L. Kathleen Mahan MS RD CDE

FOOD MICROBIOLOGY

Credits Hours: 3 (2+1) Cr. Hrs

Learning Outcomes

1. To gain a foundational understanding of relevant microorganisms and their characteristics.
2. To Learn how microorganisms interact with food and influence its quality.
3. To Understand food spoilage mechanisms and preservation techniques.
4. To Identify major foodborne pathogens and methods for prevention.
5. To Comprehend microbial involvement in fermentation and food processing.
6. To Learn techniques for maintaining and assuring food quality and safety.

Course Content:	MCQs	SEQs
1. Introduction to Food Microbiology: • Overview of microorganisms relevant to food. • Basic microbiological techniques.	**4**	**1**
2. Microbial Growth and Metabolism: • Factors influencing microbial growth in food. • Microbial metabolism and its impact on food quality.	**5**	**1**
3. Food Spoilage: • Types of food spoilage microorganisms. • Spoilage mechanisms and their effects on food.	**5**	**1**
4. Foodborne Pathogens: • Major foodborne pathogens and their characteristics. • Prevention and control of foodborne diseases.	**4**	**1**
5. Food Preservation and Processing: • Principles of food preservation (e.g., pasteurization, sterilization). • Techniques for extending shelf life and ensuring food safety.	**5**	**0.5**
6. Food Fermentation: • Microbial fermentation in food production. • Examples of fermented foods and their microorganisms.	**6**	**0.5**
7. Food Safety and Regulations: • Food safety standards and regulations. • HACCP (Hazard Analysis and Critical Control Points) system.	**1**	**1**
Total	**30**	**6**

List of Practical	OSPEs
1. Microbial Cultivation: • Isolate and cultivate microorganisms from food samples.	**1**
2. Microbial Enumeration: • Quantify microbial populations in food samples using viable plate counts and microscopic techniques.	
3. Food Spoilage Assessment: • Identify spoilage microorganisms and assess their impact on food quality.	**1**
4. Pathogen Detection: • Use PCR and ELISA for detecting foodborne pathogens.	
5. Fermentation Experiment: • Design experiments to understand microbial fermentation processes.	
6. Quality Control Tests: • Perform pH measurement, water activity determination, and texture analysis for quality assurance.	**1**

Suggested Instructional / Reading Materials

1. Microbiology. An Introduction By Gerard J. Tortora, Berdell R. Funke, Christine L. Case · 2006
2. Tortora G.J., B.R. Funke and C.L. Case. 2012. “Microbiology: An introduction”. Benjamin Cummings, UK.
3. Food Microbiology: An Introduction" by Thomas J. Montville, Karl R. Matthews, and Yvonne Salfinger
4. "Food Microbiology: Fundamentals and Frontiers" by Michael P. Doyle, Francisco Diez-Gonzalez, and Colin Hill
5. Modern Food Microbiology" by James M. Jay, Martin J. Loessner, and David A. Golden
6. Jedrychowski, L. and H.J. Wichers. 2009. Chemical and Biological Properties of Food Allergens. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.

MICRONUTRIENTS & HUMAN NUTRITION

Credits: 3 (2+1) Cr. Hrs

Learning Outcomes

1. Apply knowledge of biochemistry, physiology and other sciences in the understanding of the principles of nutrition with emphasis on micronutrients (vitamins, minerals and other minor components of the human diet).
2. To understand the functional roles of vitamins and minerals in human nutrition with special reference to metabolism

Course Content:	MCQs	SEQs
1: Introduction to Micronutrients • Definition and significance of micronutrients. • Overview of vitamins and minerals. • Historical perspectives on micronutrient research.	**2**	**0.5**
2: Fat-Soluble Vitamins (sources, functions, deficiency, and toxicity) • Vitamin A • Vitamin D • Vitamin E • Vitamin K	**4**	**1**
3: Water-Soluble Vitamins (sources, functions, deficiency, and toxicity) • Vitamin C • B Vitamins (B1, B2, B3, B5, B6, B7, B9, B12). • Choline	**4**	**1**
4: Minerals (sources, functions, deficiency, and toxicity) • Calcium • Iron • Zinc • Selenium	**4**	**1**
5: Trace Minerals (sources, functions, deficiency, and toxicity) • Iodine • Copper • Chromium • Fluoride	**4**	**1**
6: Micronutrient Interactions • Synergistic and antagonistic interactions between vitamins and minerals. • How diet composition affects micronutrient absorption and utilization.	**4**	**1**
7: Dietary Reference Intakes (DRIs) • Understanding recommended intake levels for vitamins and minerals. • Differences in requirements for various life stages and	**4**	**0.5**

population groups.		
8: Bioavailability of Micronutrients • Factors influencing the absorption and utilization of vitamins and minerals. • Enhancing bioavailability through food preparation and diet.	**4**	**1**
9: Micronutrient Deficiency Disorders • Overview of common deficiency disorders related to specific vitamins and minerals. • Global and regional prevalence of micronutrient deficiencies.	**6**	**1**
10: Micronutrients and Special Populations • Micronutrient needs during pregnancy, lactation, infancy, and aging. • Nutritional requirements for athletes and individuals with specific health condition.	**5**	**0.5**
Total	**45**	**9**

Suggested instructional / reading materials

1. Biochemical and Physiological Aspects of Human Nutrition- Martha H. Stipanuk.
2. Advanced Nutrition: Micronutrients by Carolyn D. Berdanier.
3. Krause's Food & the Nutrition Care Process 14th Edition by L. Kathleen Mahan MS RD CDE 16 edition.

PRINCIPLES OF NUTRITIONAL ASSESSMENT

Credits Hours: 3 (2+1) Cr. Hrs

Learning Outcomes

1. To gain a basic understanding of common methods of nutritional assessment, using anthropometric, biochemical and dietary approaches.
2. To gain an understanding of the benefits of using various approaches to nutritional assessment.
3. To gain an understanding of the appropriate applications of the various methods and the interpretation of results.
4. To obtain hands-on experience and basic training in common nutritional assessment methods.

Course Content:	MCQs	SEQs
1: Introduction to Nutritional Assessment • Overview of the course, objectives, and importance. • Historical development and evolution of nutritional assessment. • Ethical considerations in nutritional assessment.	**2**	**0.5**
2: Dietary Assessment • Dietary intake assessment methods: 24-hour recalls, food records, and food frequency questionnaires. • Advantages and limitations of each dietary assessment method. • Computer-based dietary assessment tools and software.	**3**	**0.5**
3: Anthropometric Measurements • Basics of anthropometry: height, weight, body mass index (BMI), and body composition. • Interpretation of anthropometric data. • Growth assessment in children and adolescents.	**3**	**0.5**
4: Clinical Assessment • Physical examination and clinical indicators of nutritional status. • The importance of a complete medical history. • Common clinical signs of malnutrition and specific nutrient deficiencies.	**3**	**0.5**
5: Biochemical Assessment • Blood tests and biomarkers for nutritional assessment. • Interpretation of blood values for key nutrients (e.g., iron, vitamin D, folate, calcium, albumin). • Specialized tests for assessing nutritional status (e.g., bone density, fatty acid profiles).	**3**	**0.5**
6: Functional and Dietary Assessment • Functional assessments (e.g., grip strength, cognitive function) in nutritional evaluation. • Dietary pattern analysis and nutritional adequacy.	**3**	**0.5**

• Specialized assessments for individuals with specific conditions (e.g., diabetes, hypertension, celiac disease, thyroid disfunction).		
7: Nutritional Screening and Assessment Tools • Introduction to screening tools (e.g., MUST, SGA) and comprehensive assessment tools (e.g., NRS-2002). • Practical use and administration of assessment tools. • Interpreting and communicating assessment results.	**3**	**0.5**
8: Nutritional Assessment in Special Populations • Nutritional assessment considerations for infants, children, adolescents, pregnant women, and the elderly. • Assessing the nutritional needs of athletes and individuals with eating disorders.	**2**	**0.5**
9: Assessing Dietary Patterns and Cultural Considerations • Evaluation of diverse dietary patterns and cultural influences. • The role of cultural competence in nutritional assessment.	**2**	**0.5**
10: Technology and Nutritional Assessment • The role of technology (apps, wearable devices) in nutritional assessment. • Utilizing software and tools for data collection and analysis.	**2**	**0.5**
11: Data Interpretation and Report Preparation • Data analysis and interpretation. • Preparing comprehensive nutritional assessment reports.	**1**	**0.5**
12: Ethics and Confidentiality • Ethical considerations in nutritional assessment, including patient confidentiality and informed consent. • Ethical dilemmas in the field of nutrition.	**1**	**0.5**
13. Quality Assurance and Validation in Nutritional Assessment • Ensuring the accuracy and reliability of assessment methods. • Validation and standardization of assessment tools.	**2**	
Total	**30**	**6**

List of Practical	OSPEs
1. Introduction to Nutritional Assessment 2. Standards for nutrient intake 3. Dietary reference intakes 4. Direct &indirect measures. 5. Nutritional assessment of ambulatory and bed ridden patients 6. Basic nutrition calculations, calculations of Physical activity of ambulatory and non-ambulatory individuals. 7. Calculation of energy & protein requirements of hospitalized and outdoor patients. 8. MNA, MUST, SGA, growth charts.24-hour recall of indoor and outdoor patient 9. FFQ development 10. Food labels 11. Exchange list for meal planning.	**3**

Suggested Instructional / Reading Materials

1. Nutritional Assessment by Robert D. Lee and David C. Nieman
2. Food & Nutrition Care Process by Krause
3. Recent research according to the topic.

NUTRITION THROUGH LIFECYCLE

Credits Hours: 3 (3+0)

LEARNING OUTCOMES

1. To explain the nutritional foundations necessary for the growth, development, and normal functioning of individuals in each stage of the life span and the role diet and nutrients.
2. To develop an understanding of lifecycle concept and nutritional influences on lifelong health.

Course Content:	MCQs	SEQs
1: Introduction to Life Cycle Nutrition • Overview of the course, objectives, and importance. • Introduction to life stage nutrition and its relevance to overall health. • Ethical considerations and cultural influences in life cycle nutrition.	**3**	**1**
2: Prenatal Nutrition • Nutrition during preconception and pregnancy. • Key nutrients during pregnancy • Addressing common pregnancy-related nutritional challenges.	**2**	**1**
3: Infant Nutrition • Infant feeding recommendations: breastfeeding, formula feeding, and introduction to solids. • Nutritional needs during the first year of life. • Common feeding challenges and solutions.	**6**	**1**
4: Toddler and Preschooler Nutrition • Nutritional requirements for toddlers and preschoolers. • Age-appropriate portion sizes and food choices. • Strategies for addressing picky eating behaviors.	**4**	**0.5**
5: School-Aged Children and Adolescents • Nutritional needs and growth patterns during childhood and adolescence. • Factors influencing dietary choices in this age group. • Addressing nutrition-related issues like obesity and eating disorders.	**4**	**1.5**
6: Nutrition During the Teenage Years • Specific nutrient needs during puberty and adolescence. • Body image, dieting, and eating disorders in teenagers. • Promoting healthy eating habits and positive body image.	**6**	**0.5**
7: Nutrition in Young Adulthood • Nutritional requirements for young adults. • Balancing diet with the demands of work, social life, and physical activity. • Nutrition for optimal mental health and cognitive function.	**6**	**0.5**
8: Nutrition in Lactation • Nutrient needs for breastfeeding mothers.	**6**	**1**

• Addressing common nutritional challenges during this life stage.		
9: Nutrition in Middle Adulthood • Nutritional requirements during middle adulthood. • Nutrition-related health concerns, such as heart disease and osteoporosis. • Strategies for maintaining a healthy weight and preventing chronic diseases.	**4**	**1**
10: Nutrition in Older Adulthood • Nutritional needs in later life, including changes in metabolism and digestion. • Addressing age-related nutritional concerns like sarcopenia and cognitive decline. • Strategies for maintaining quality of life and independence through nutrition.	**4**	**1**
Total	**45**	**9**

Suggested Instructional / Reading Materials

1. Nutrition through the Life Cycle by Judith E. Brown 6th edition
2. Krause's Food and Nutrition and Diet Therapy
3. Understanding Nutrition by Ellie Whitney and Sharon Rady Rolfes
4. Recent research according to the topic.

FUNDAMENTALS OF FOOD SERVICE MANAGEMENT

Credits Hours: 3 (2+1)

Learning Outcomes

1. To make students aware of food service industry, its latest trends and requirements.
2. To help students understand the unique aspects of food service industry and its distinct segments.
3. To learn about the basics of menu planning & recipe standardization.
4. To develop an understanding of planning considerations for a successful food service operation.
5. To enable students to learn about designing of the food service system.
6. To understand the importance of effective purchasing, receiving, storage and distribution practice.

Course Content:	MCQs	SEQs
1: Introduction to Food Service Management • Overview of the course, objectives, and the role of food service in nutrition. • History and evolution of food service management. • Current trends and challenges in the food service industry.	**1**	**0.5**
2: Types of Food Service Operations • Introduction to different types of food service establishments (e.g., restaurants, cafeterias, healthcare facilities). • Understanding the specific requirements and challenges of each type.	**3**	
3: Menu Planning and Development • Menu design and development. • Principles of nutrition in menu planning. • Special dietary considerations and allergen management.	**3**	**0.5**
4: Food Production and Kitchen Operations • Kitchen layout and design. • Food preparation methods and techniques. • Food safety and sanitation in food production.	**3**	**0.5**
5: Food Procurement and Inventory Management • Sourcing food products and ingredients. • Inventory management, purchasing, and supplier relationships. • Sustainable sourcing and ethical considerations.	**3**	**0.5**
6: Cost Control and Budgeting • Cost control techniques in food service. • Budget development and financial management. • Pricing strategies and menu engineering.	**3**	**0.5**
7: Nutrition Analysis and Labeling • Nutritional analysis of menu items.	**2**	**0.5**

• Compliance with nutritional labeling regulations. • Communicating nutritional information to customers.		
8: Customer Service and Hospitality • Customer service principles and best practices. • Building a customer-centric culture. • Handling customer feedback and complaints.	**2**	**0.5**
9: Human Resource Management • Staffing, hiring, and training in food service. • Employee motivation and management. • Labor laws and regulations.	**2**	**0.5**
10: Marketing and Promotion • Marketing strategies for food service establishments. • Social media and digital marketing. • Branding and promotional campaigns.	**2**	**0.5**
11: Food Service Technology • Utilizing technology for food ordering, reservations, and management. • Point of Sale (POS) systems and kitchen management software. • Online food delivery and restaurant apps.	**2**	**0.5**
12: Food Service Sustainability • Sustainable practices in food service, including waste reduction, recycling, and sourcing. • Reducing the carbon footprint and environmental impact. • Ethical considerations in food service operations.	**2**	**0.5**
13: Health and Safety Regulations • Compliance with food safety regulations and inspections. • Occupational health and safety in food service.	**2**	**0.5**
Total	**30**	**6**

List of Practical	**No. of OSPEs**
• Menu Planning • Recipe Standardization • Sensory Evaluation • Basics of Equipment • Visit to a Restaurant Kitchen- Report Writing • Table Setting, Individual Tray Setting • Kitchen Layouts • Visit to a Commercial Kitchen and Report writing • HACCP (Hazard Analysis & Critical Control Points)	**3**

Suggested Instructional / Reading Materials

1. Food Service Management: Principles and Practices by June Payne-Palacio, Monica Theis, 2. Institutional Manageme

Allied Health Sciences

Curricula 2024

BS OPERATION THEATER TECHNOLOGY

CURRICULUM

SCHEME OF STUDIES

SEMESTER	COURSE CODE	COURSE TITLE	THEORY	PRACTICAL	CREDIT HOURS
1st Semester	GEFE	Functional English	03	0	03
	GEQR	Quantitative Reasoning-I	03	0	03
	GENS	Natural Sciences	02	1	03
	GEAH	Arts and Humanities	02	0	02
	GEICP	Ideology and Constitution of Pakistan	02	0	02
	IDC	Basic Biochemistry	03	0	03
	PERL-I	PERL-I	01	0	01
Total Credit Hours					**17**
2nd Semester	GEEW	Expository Writing	03	0	03
	GEQR	Quantitative Reasoning-II	03	0	03
	GESS	Social Sciences	02	0	02
	GEIE	Islamic Studies/Ethics	02	0	02
	BAN	Basic Anatomy	03	0	03
	BPH	Basic Physiology	03	0	03
	PERL-II	PERL-II	01	0	01
Total Credit Hours					**17**
3rd Semester	GEE	Entrepreneurship	02	00	02
	GECCM	Civics and Community Engagement	02	00	02
	GEICT	Applications of Information and Communication Technologies (ICT)	02	01	03
	GPA	Gen Pathology	03	00	03
	MAA	Anatomy II	03	00	03
	MAP	Physiology II	03	00	03
	MFOT	Fundamentals of Operation theater technology	02	01	03
	EPC-I	English Proficiency-I	02	00	02

	PERL-III	PERL-III	01	00	01
Total Credit Hours					**22**
4th Semester	MPH	Pharmacology	02	01	03
	MM-I	Microbiology- I	02	01	03
	MMP	Medical Physics	02	01	03
	MBS	Behavioral Sciences II	03	00	03
	PS	Pakistan Studies	02	00	02
	EPC-2	English Proficiency-2	02	00	02
	PERL-IV	PERL-IV	01	00	01
Total Credit Hours					17
5th Semester	MM-II	Microbiology- II	02	01	03
	MFPO	Fundamentals of Peri operative care	02	01	03
	MSD-I	Sterilization Disinfection – I	02	01	03
	MIE-I	Instrument and Equipment- I	02	01	03
	MBA	Basic Anesthesia techniques	02	01	03
	MMEL	Medical Ethics & Law	03	00	03
	EPC-3	English Proficiency-3	02	00	02
	PERL-V	PERL-V	01	00	01
Total Credit Hours					**21**
6th Semester	MSD-II	Sterilization Disinfection – II	02	01	03
	MIE-II	Instrument and equipment- II	02	01	03
	MBS	Biomaterial and Surgical implants	02	01	03
	MPS	Principles of Surgery	02	01	03
	MEI	Fundamentals of Infection Control	02	01	03
	MEPH	Epidemiology & Public Health	03	00	03
	EPC-4	English Proficiency-4	02	00	02
	PERL-VI	PERL-VI	01	00	01
Total Credit Hours					**21**

7th Semester	MEE-I	Endoscopic Equipment – I	02	01	03
	MOT-I	Operation Theatre Management- I	02	01	03
	MCSSD-I	CSSD Management-I	02	01	03
	MRM	Research Methodology	03	00	03
	INT	Internship/Field Experience	03	00	03
	EPC-5	English Proficiency-5	02	00	02
	PERL-VII	PERL-VII	01	00	01
Total Credit Hours					**18**
8th Semester	MEI	Emergency And Intensive Care	02	01	03
	MQS	Quality and safety in Health	02	01	03
	MEE-II	Endoscopic Equipment – II	02	01	03
	MOT-II	Operation Theatre management- II	02	01	03
	MCSSD-II	CSSD Management-II	02	01	03
	CAP	Capstone Project	03	00	03
	EPC-6	English Proficiency-6	02	00	02
	PERL-VIII	PERL-VIII	01	00	01
Total Credit Hours					**21**

ANATOMY II

Credit Hours: 3 (3+0)

Learning Outcomes:

The students will able to:

1. Identify the basic organizational function of human body, including body planes, general organization and terms of tissues
2. Analyze the types of tissues that make up organs & characteristics of each tissue
3. Analyze the different body systems for composition &function.

List of Topics		MCQs	SEQs
I.	**Organization of the human body** Introduction to human body, Definition and subdivision of anatomy, Anatomical position and terminology, Region and systems of the body, Cavities of the body and their contents, Levels of organization of the body.	5	0
II.	**The Nervous System** Division of the Nervous System and characteristics, Central Nervous System, Peripheral Nervous System, Autonomic Nervous System, Special Senses	15	03
III.	**Anatomical pathways** Olfactory system---- olfactory neurons, Hearing and Balance, structure of the outer middle and inner ear, Taste ---- taste bud.Visual --- chambers of the eye and structure of the rods and cones. The structure of a neuron, nerve, nerve tract, nucleus, and ganglion. The components of a reflex arc and synapse. The three meningeal layers surrounding the central nervous system, Cerebrospinal fluid and its circulation. List the various cranial nerves. Various lobes of the brain and the cerebellum	10	03
IV.	**Anatomy of the Heart** The size, shape and location of the heart and**,** Chambers, valves and their locations **,** The location of the coronary arteries**,** The structure of the conduction system of the heart**,** Pulmonary and systemic circulation**,** The structure of arteries, capillaries and veins**,** Major arteries and veins and the body areas, they supply**,** Lymphatic system tonsils, lymph nodes, the spleen and the thymus **,** The anatomy of the respiratory passages, beginning at the nose and ending with the alveoli, The lobes of the lungs and the membranes that cover the lungs, Pleural cavity, The muscles of contraction of respiration	15	03

Recommended Books:

Latest available Editions of following

1. Richard Drake PhD FAAA (Author), A. Wayne Vogl PhD FAAA (Author), Adam W. M. Mitchell MB BS FRCS FRCR. 2015. Gray's Anatomy for Students: 3rd Edition. Elsevier Publishers USA
2. Agur, M.R. and F.D. Arthur. 2016. Grant's Atlas of Anatomy; 14thEdition. Lippincott Williams and Wilkins, New York, U.S.A.
3. Gerard, J. T. and T.N. Mark. 2013. Principles of Human Anatomy; 13thEdition. John Wiley and Sons, Inc., New York, USA.

PHYSIOLOGY II

Credit Hours: 3 (3+0)

Learning Outcomes:

- The students will able to:

To acquire knowledge of various aspects of human physiology

List of Topics		No. of MCQs	No. of SEQs
I.	**CNS** Functions of the central nervous system, The functional areas of the cerebral cortex and their interactions, Functions of the parts of the brainstem diencephalons, basal nuclei, Limbic system and cerebellum, Functions of various cranial nerves, Functions of the somatic motor nervous system, Functions of the autonomic nervous system, The function of neurons, neuroglia cells and their components, Resting membrane potential and an action potential	10	03
II.	**Special senses:** The function of a synapse and reflex arc, Eye physiology of site, accommodation, optic nerve and optic chiasma, Ear functions of the internal, middle and external ear, Physiology of the hearing and balance, Smell physiology of olfactory nerve, Taste physiology of taste, Location of the taste buds, Physiology of speech	5	1
III.	**CVS:** Functions of the Heart, Electrical Activity of the Heart origin and propagation of cardiac impulse, Phases of the Cardiac Cycle, ECG, Heart Sounds, Regulation of Heart Functions--- intrinsic and extrinsic, Functions of the Peripheral Circulation, The Physiology of Circulation, Pulmonary Circulation, Systemic Circulation: Arteries, Veins, Local Control of Blood Vessels, Nervous Control of Blood Vessels	20	03
IV.	**Genitourinary systems and GIT** Male and female reproductive system. Physiology of GIT	10	2

Recommended Books:

Latest available Editions of following

1. Guyton and Hall Text Book of Medical Physiology (2015) 13th Edition by John E. Hall, W.B Saunders Company.
2. Human Physiology: The Mechanisms of Body Function (2001) 8th Edition Arthur J.Vender, James H. Sherman, Dorothy S. Luciano, McGraw-Hill Company

PHARMACOLOGY

Credit Hour: 3 (2+1)

Course Objective:

The course will provide knowledge in

- General pharmacology with special emphasis on common drugs used
- Routes of administration, types of formulations, dose and frequency of administration,
- Side effects and toxicity, management of toxic effects, drug interactions,
- Knowledge of chemical and trade

List of Topics	MCQs	SEQs
General Pharmacology Introduction to pharmacology-various terminologies-sources & routes of drug administration –Absorption & Factors modifying drug absorption – Distribution of drugs – Metabolism, Excretion: routes, modes & kinetics of elimination – Excretion – Mechanism of drug action in brief, Synergism& antagonism and Factors modifying drug action – Adverse drug reactions – Drug interactions	10	01
Central Nervous System & Respiratory System Introduction to CNS and Neurotransmitters, Sedatives and hypnotics – Diazepam – alprazolam, anti-anxiety drugs, General Anesthetics – halothane, isoflurane, sevoflurane – Local Anesthetics Lignocaine – list of other drugs, Alcohols – ethyl alcohol – disulfuram, Opioids – morphine – naloxone – tramadol – pentazocine, NSAIDs – aspirin – diclofenac– ibuprofen – paracetamol – Cox 2 inhibitors. Drugs used in bronchial asthma and cough	05	01
Cardio vascular System & Blood Disease-nitrates-Calcium channel blockers-nifedipine, verapamil-list of other drugs – Beta blockers – propronolol, atenolol – metoprolol and antiplatelets – aspirin, clopidogrel, and names of other drugs-fibrinolytic drugs-streptokinase and other drugs, Hypertension – outline of drugs used in hypertension, Rennin angiotensin system – ACE inhibitors – captopril, ramipril and names of other drugs – Receptor antagonist – losartan and list of other drugs,	05	01
Chemotherapy Introduction – Beta lactum antibiotics: Penicillin's – natural, semi synthetic penicillin's – amoxicillin –cloxacillin-clauvulinic acid – sulbactum – Cephalosporin's – cephalexin – cefuroxime – cefixime –ceftrioxone-cefipime, Broad spectrum antibiotics – Doxycycline – chloramphenicol-imipenum-Macrolides – erythromycin, azithromycin and other Quinolones-ciprofloxacin and list of other drugs and sulfonamides- cotrimoxazole- Toxicology-Drugs used in common poisoning, organophosphates, methyl alcohol, Benzodiazepam.	05	01

Miscellaneous Antibiotics, Antiseptics & Disinfectants, IV fluids, various preparations NaCl, Ringer lacatate, haemaceal, hetastarch, heparin, protamine, analgesics.	05	02

TOS of Practical: PHARMACOLOGY

List of Topics	No. of OSPE
General Pharmacology Routes of drug administration –Absorption & Factors modifying drug absorption – Distribution of drugs – Metabolism, Excretion: routes, modes & kinetics of elimination – Excretion – Mechanism of drug action in brief, Synergism& antagonism and Factors modifying drug action – Adverse drug reactions – Drug interactions	1
Central Nervous System & Respiratory System General Anesthetics – halothane, isoflurane, sevoflurane – Local Anesthetics Lignocaine – list of other drugs, Alcohols – ethyl alcohol – disulfuram, Opioids – morphine – naloxone – tramadol – pentazocine, NSAIDs – aspirin – diclofenac– ibuprofen – paracetamol –	1
Cardio vascular System & Blood Beta blockers – propronolol, atenolol – metoprolol and antiplatelets – aspirin, clopidogrel, and names of other drugs-fibrinolytic drugs-streptokinase and other drugs, Hypertension – outline of drugs used in hypertension, Rennin angiotensin system – ACE inhibitors – captopril, ramipril and names of other drugs	0.5
Miscellaneous Antibiotics, Antiseptics & Disinfectants, IV fluids, various preparations NaCl, Ringer lacatate, haemaceal, hetastarch, heparin, analgesics.	0.5

Reference Books

1. Basic & Clinical pharmacology 12th edition by Bertram G. Katzung. McGraw Hill
2. Lippincott's illustrated Review, Pharmacology – Whalen, Karen 6th edition.

MICROBIOLOGY-I

Credit Hour: 3 (2+1)

Course Objective:

The learner will be able to

- Compare and contrast the structure and characteristics of different organisms
- Identification of Common pathogenic bacteria in the operating room environment and strategies for their containment.
- Correlate the impact of microbiology in relationship to the practice of the sterile techniques and infection control in the operating room and health care workers
- Relate the infectious process to surgical practice and preventive measure to break the chain of infection
- Correlate the impact of microbiology in relationship to the practice of the sterile techniques and infection control in the operating room

Topic	MCQs	SEQs
General Bacteriology Introduction & History of Microbiology, Classification & Morphology of Bacteria, Growth & Nutrition, Culture Media & Methods, Sterilization & Disinfection, Fundamental aspects of antibacterial agents and antimicrobial susceptibility testing.	15	3
Special Bacteriology Gram Positive Cocci (Staphylococci, Streptococci, Enterococci), Gram Positive Rods (Bacillus, Listeria,Clostridium Actinomyces), Gram Negative Cocci (Neisseria), Gram Negative Rods (Enterobacteriaceae, Pseudomonas, Vibrio, Haemophilus,E. coli, Klebsiella Salmonella), Miscellaneous (Chlamydia, Rickettsia, Legionella, Helicobacter), Introduction to Mycobacterium (Tuberculosis, Lapras Bovis), AMR (Anti-microbial drug resistance), MRSA, VRSA, Multi drug resistant bacteria and their management	15	3

TOS of Practical: MICROBIOLOGY-I

Topic	No. of OSPE
Component of microscope:	1
Classification & Morphology of Bacteria, Growth & nutrition, Culture Media & Methods, Sterilization & Disinfection	
• Gram Positive Cocci (Staphylococci, Streptococci, Enterococci) • Gram Positive Rods (Bacillus, Listeria, Clostridium Actinomyces) • Gram Negative Cocci (Neisseria) • Gram Negative Rods (Enterobacteriaceae, Pseudomonas, Vibrio, Haemophilus,E. coli, Klebsiella Salmonella) • Miscellaneous (Chlamydia, Rickettsia, Legionella, Helicobacter) • Introduction to Mycobacterium (Tuberculosis, Lapras Bovis) • AMR (Anti-microbial drug resistance) • MRSA • VRSA • Multi drug resistant bacteria and their management	1
Gram staining (Gram stains & ZN stain)	1
Culturing Techniques (Media preparation)	

Reference Books

Latest available Editions of following

1. Review of Medical Microbiology and Immunology by Warren Lenvinson: 13th Edition, MaCraw Hill
2. Medical Microbiology and Immunology By Levinson And Jawetz

MEDICAL PHYSICS

Credit Hour: 03(2+1)

Course Objective:

To enable the students to

- Describe basic principles of physics used in Applied Medical Physics
- To understand the physics involved in the human body.
- Define laws of physics various aspect of physical phenomena and their interaction with human body
- Describe basic concepts of electricity, its laws, magnetism, electro mechanics and related theories
- Explain fundamentals of low, medium and high frequency currents, heat, electromagnetic radiations and sound waves.
- Demonstrate safety skills in biomedical instruments and radiation protection

Topic	MCQs	SEQs
Heat and Thermodynamics Thermal Properties of Matter, Temperature scales and their relationships, Linear and Volume expansions, State functions, Concept of Entropy, Nature of Heat, Internal Energy, Gas Laws, Laws of Thermodynamics, Heat Capacity and Specific heat, Latent Heat and Specific Latent heat, Temperature gradient,	3	2
Fluid mechanics Concept of Buoyant force and Archimedes principle, Pressure and Pascal's Principle, measurement of pressure, Equation of Continuity, Bernoulli's Equation, Streamline and Ideal and non-ideal fluid, Streamline and Turbulent flow, Measurement of Blood Pressure, Physics of blood circulation, Ohms law of blood flow, Poiseuille's law, Laplace Law.	4	1
Radiation physics Electromagnetic Radiations, Electromagnetic spectrum, Properties of Electromagnetic radiations, Inverse square law, relation between energy frequency and Wavelength, production of x-ray, Radioactivity, natural and Artificial Radioactivity, Half-life, Medical use of Ionizing radiations, nuclear medicine, introduction to diagnostic procedures; X-Ray, Fluoroscopy, CT, MRI, Ultrasound, SPECT and PET.	4	1
Radiation Protection Ionizing and non-ionizing radiations, Quantities and associated units of radiations, Radiation dose Cardinal principle (Time, Distance and shielding), Concept of ALARA	2	0
Optical instruments Principles of reflections and refractions of light, Telescope, Total internal reflection, Applications of fiber optics in medicine, Endoscopes, endoscopic cameras. Types of endoscopic tools attached with endoscopes.	5	1

Power Supply and Transducers AC and DC Currents, Diode, transistor, half wave Rectifier, Full wave Rectifier, Transducers, Active and Passive Transducers, Primary and Secondary Transducers, applications of transducers	3	
Safety in Biomedical Instruments Electrical outlets, hot, neutral and ground connections, Pervasiveness of electricity and of electric shocks, causes of electric shocks and precaution, Effect of electric current on human body, Techniques to reduce the effect of electric shock, Earth shocks and precaution against earth shocks	6	1
Medical Gas supply Demonstration of central medical gas supply, Arrangement of Medical Gas supply, Pressure reducing valves, behavior of compressed gasses, Boilers and Behavior of the steam.	3	

TOS of Practical: MEDICAL PHYSICS

Topic	OSPE
Gas Cylinders of different gasses, their distribution in OR through central supply, color codes	1
Identify different equipment that uses the laws of physics in OR	
Safety SOPs for use of electrical and energy equipment for patients, Health care workers and Environment	1
Minor troubleshooting of theater equipment	
SOPs for Emergencies related to Equipment	1

Reference Books:

1. Nelson P, 2004. Biological Physics, Energy, Information and Life. First Edition; WH Freeman & Company
2. Davidovits P, 2013. Physics for Biology & Medicine. Fourth Edition; Academic Press.

FUNDAMENTALS OF OPERATION THEATRE TECHNOLOGY

Credit Hour: 03(2+1)

Course Objective:

After completion of this course students will be able to understand

- Basic layout of operating rooms and the
- Necessary requirements for specialty operating rooms related to different surgeries

Topic	No. of MCQs	No. of SEQs
Operating Room Design and Construction: OR design and floor Plan**,** Design to Decrease flow disruption, Design of Individual OR, Equipment planning, New Technology Integrated OR	5	1
Principal of OR layouts: Space requirement, Ceiling Mounted Boom,Traffic pattern, Environmental control, communication systems.	3	1
Operating Room: Location, floor Plan, Environmental systems i.e., Gases, Suction, Electrical outlets, Temperature, Humidity	7	1
Ventilation Systems: Positive Pressure, Negative Pressure, Air exchange rate, laminar Air flow	3	1
Environment & Safety standards: Traffic pattern, Electrical Hazards, Fire Safety, Radiation protection, Surgical Plume**,** OSHA Guidelines, Material safety Data sheet, CDC guideline, Post exposure protocols	5	0
Ambulatory Surgery centers: Design Consideration of Ambulatory Surgical Centers, Types of Ambulatory Surgical Settings- Alternative Sites where surgery is performed	2	1
Specialized Surgical Equipment: Laser**:** Laser biophysics, benefits, laser systems, laser safety, Patient safety , Ultrasonic Scalpel: Use of Harmonic, Microsurgery-Integrated technologies - Argon beam coagulator, Cavitron Ultrasonic surgical aspirator, Cardiopulmonary Bypass Machine (Heart Lung Machine)- Vitrectomy / Cataract Removal Machine- Cryotherapy machine- Phaco-emulsifier, Coblator- Straight Shot- Morcellator, Vacuum Curettage- Liposuction, Microscope- Dermatome and mesher, Suction systems, Lights, Sequential compression devices	5	1

TOS of Practical: FUNDAMENTALS OF OPERATION THEATRE TECHNOLOGY

Topic	No. of OSPE
OT layouts (conventional, modular) of hospitals	1
• Safety precautions/ SOPs of Biomedical Equipment	1
• Safe handling and use of Biomedical Equipment • technologies	1
• Troubleshooting of medical devices	

Recommended Books

Latest available Editions of following

1. Berry & Kohn's Operating Room Techniques 12th Edition by Nancymarie Phillips, Published Date: 27th February 2012
2. Surgical Technology Principles & Practice 6th Edition by Joanna KotcherFuller, W B Saunders,2010

BEHAVIORAL SCIENCES II

Credit Hours: 03(3+0)

Course Objectives:

- To enable students to understand behaviors, Ethics and health psychology

Topic	MCQs	SEQs
Introduction to Behavioral Sciences and its importance in health	2	1
Understanding Behavior	2	
Individual Differences	2	
Learning	2	1
Stress and Stressors	2	
Life Events	2	
Stress Management	2	
Interviewing / Psychosocial History Taking	2	1
Allied Health Ethics-Hippocratic Oath	2	1
Culture and Allied Health practice	2	
Psychological Reactions	4	0
Breaking Bad News	5	1
Pain, Sleep, Consciousness	4	1
Communication Skills	9	2
Health psychology	3	1

Recommended Books

Latest available Editions of following

1. Hand book of Behavioural Sciences by Mowadat H Rana 3rd edition 2016
2. Sadock, Bejamnin J., and Virginia A Sadock. Kaplan and Sadock's synopsis of psychiatry: behaviouralSciences /Clinical Psychiatry, Lipponcott Williams & Wilkins, 2014

Allied Health Sciences

Curricula 2024

BS OPTOMETRY & ORTHOPTICS

CURRICULUM

SCHEME OF STUDIES

SEMESTER	COURSE CODE	COURSE TITLE	THEORY	PRACTICAL	CREDIT HOURS
1st Semester	GEFE	Functional English	03	00	03
	GEQR	Quantitative Reasoning-I	03	00	03
	GENS	Natural Sciences	02	01	03
	GEAH	Arts and Humanities	02	00	02
	GEICP	Ideology and Constitution of Pakistan	02	00	02
	IDC	Basic Biochemistry	03	00	03
	PERL-I	PERL-I	01	00	01
Total Credit Hours					**17**
2nd Semester	GEEW	Expository Writing	03	00	03
	GEQR	Quantitative Reasoning-II	03	00	03
	GESS	Social Sciences	02	00	02
	GEIE	Islamic Studies/Ethics	02	00	02
	BAN	Basic Anatomy	03	00	03
	BPH	Basic Physiology	03	00	03
	PERL-II	PERL-II	01	00	01
Total Credit Hours					**19**
3rd Semester	GEE	Entrepreneurship	02	00	02
	GECCM	Civics and Community Engagement	02	00	02
	GEICT	Applications of Information and Communication Technologies (ICT)	02	01	03
	GPA	Gen Pathology	03	00	03
	MOA	Ocular Anatomy	03	00	03
	MOP	Ocular Physiology	03	00	03
	EPC-I	English Proficiency-I	02	00	02
	PERL-III	PERL-III	01	00	01
Total Credit Hours					**19**

4th Semester	PGI	Physical/ Geometrical/Instrumental Optics	02	02	04
	OP-I	Ocular Pathology –I	02	01	03
	OPh	Ocular Pharmacology	02	00	02
	ORT	Orthoptics-I	01	01	02
	Neu	Neuroanatomy	02	01	03
	CM-I	Clinical Medicine in Optometric Practice-I	03	00	03
	PS	Pakistan Studies	02	00	02
	EPC-2	English Proficiency-2	02	00	02
	PERL-IV	PERL-IV	01	00	01
Total Credit Hours					**22**
5th Semester	CM-II	Clinical Medicine In Optometric Practice-II	02	01	03
	OD	Ophthalmic Dispensing	02	02	04
	ORT-II	Orthoptics-II	03	01	04
	OP	Optometric Procedures	00	02	02
	OP-II	Ocular Pathology-II	02	01	03
	IEH	Inclusive Eye Health (Basic & Intermediate Level)	01	01	02
	EPC-3	English Proficiency-3	02	00	02
	PERL-V	PERL-V	01	00	01
Total Credit Hours					**21**
6th Semester	PVO	Physiological & Visual Optics	02	01	03
	CL-I	Contact Lenses-I	02	01	03
	LV-I	Low Vision-I	02	01	03
	POp	Pediatric Optometry	02	01	03
	POIE	Preventive Ophthalmology & Inclusive Eye Health-Advanced	03	00	03
	OD	Ocular Diagnostics	01	02	03
	EPC-4	English Proficiency-4	02	00	02
	PERL-VI	PERL-VI	01	00	01
Total Credit Hours					**21**

7th Semester	LV-II	Low Vision-II	02	01	03
	CL-II	Contact Lenses-II	00	03	03
	Int	Clinical Rotation/ Internship/ field experience	00	03	03
	N-Op	Neuro-Ophthalmology	02	01	03
	GO	Geriatric Optometry	02	01	03
	OO	Occupational Optometry	02	01	03
	EPC-5	English Proficiency-5	02	00	02
	PERL-VII	PERL-VII	01	00	01
Total Credit Hours					**21**
8th Semester	OCB	Ophthalmic Care and Basics of Surgery	02	01	03
	El-Ort	Elective From Orthoptics	01	02	03
	El-Opt	Elective From Optometry	01	02	03
	RM	Research Methods	03	00	03
	BRM	Biosafety & Risk Management	02	01	03
	EPC-6	English Proficiency-6	02	00	02
	PERL-VIII	PERL-VIII	01	00	01
	CP	Capstone Project		03	03
Total Credit Hours					**21**

Ocular Anatomy

Credit Hours 3(3+0)

Learning Objectives/Objectives:

Upon successful completion of the ocular anatomy course, students should be able to:

- Demonstrate a comprehensive understanding of the anatomical structures of the eye and their respective functions.
- Apply anatomical knowledge adeptly to both identify and diagnose a diverse range of ocular conditions and diseases.
- Describe the intricate relationships between ocular anatomy and visual function, encompassing aspects of refraction and accommodation.
- Recognize and emphasize the vital importance of maintaining eye health through a clear explanation of ocular structure anatomy.
- Explain the visual pathway from the eye to the brain, highlighting its significance in the complex process of vision.

TOPIC	MCQs	SEQs
Anatomy (General Introduction) Anatomy of the Eye Lid Anatomy of the Cornea Anatomy of the Sclera and its Openings Anatomy of the Limbus and Conjunctiva Anatomy of the Anterior Chamber	15	3
Anatomy of the Lacrimal Apparatus Anatomy of the Extra – Ocular Muscles Anatomy of the Skull & Orbit Anatomy of the Uveal Tract Anatomy of the Lens & Vitreous (Accommodation)	10	2
Anatomy of the Retina Anatomy of the Choroid Anatomy of the Brain Anatomy of the Optic Nerve & Tract Anatomy of the Visual Cortex Anatomy of the Visual Pathway	10	2
Anatomy of Cranial Nerves (I – VII) Pupil Binocular single vision Intraocular Pressure & Glaucoma	10	2

RECOMMENDED BOOKS:

1. Anatomy of Eye By: Richard Snell
2. Anatomy & Physiology of Eye By: AK Khurrana
3. American Academy of Ophthalmology

Ophthalmic Physiology (Ocular Physiology)

Credit Hours: 3 (3+0)

Learning Objectives:

- Explain the anatomy and functional roles of eyelids, detailing their crucial role in safeguarding the eye.
- Elaborate on the mechanisms of blinking and its significance in maintaining optimal ocular health.
- Describe the physiology of Extraocular Muscles (EOMs), emphasizing their control of eye movements and contribution to binocular vision.
- Explain the physiological properties of the cornea, including transparency and refractive functions, along with the role of corneal innervation in preserving corneal health.
- Provide a comprehensive understanding of tear film formation, stability, and the physiology of the lacrimal apparatus, emphasizing their collective role in maintaining a healthy ocular surface.

Content:

<table>
<tr><th>Topic</th><th>MCQs</th><th>SEQs</th></tr>
<tr><td>1. ORBIT:
Embryology, Globe, size, position & relation to head, Facial System & fat, Vasculature, Lymphatic Drainage</td><td rowspan="3">15</td><td rowspan="3">3</td></tr>
<tr><td>2. EYELIDS:
Dimensions, Physiology, Eyelid Movements, Hemifacial Spam, Blepharospasm</td></tr>
<tr><td>3.CONJUNCTIVA:
Morphology, Stem cells of Ocular surface, Dynamics of conjunctiva during eye movements</td></tr>
<tr><td>4. LACRIMAL SYSTEM:
Lacrimal gland embryology
Lacrimal gland & Accessory Glands Physiology
Functions of tear film
Regulation of main lacrimal gland secretion and meibomian glands
Anatomy and physiology of lacrimal excretory system</td><td rowspan="2">10</td><td rowspan="2">2</td></tr>
<tr><td>5. CORNEA:
Anatomy & development
Functions of different Layers of Cornea
Vasculature & nutrition
Nerve Supply
Physiology, biochemistry & cell biology of cornea:
Corneal Transparency
Refractive role of cornea
Sclera:</td></tr>
</table>

• Gross & cellular anatomy • Development • Nerve supply, blood supply & Lymphatics		
6. LENS: • Anatomy & dimensions of adult lens • Basics of lens transparency & refeaction • Early development • Energy production • water & electrolyte balance • Changes with aging • Lens capsule & zonules		
7.ACCOMMODATION & PRESBYOPIA: • Accommodation • Mechanism of accommodation • Stimulus of accommodation • Factors contributing to Presbyopia		
8.AQUEOUS HUMOUR / IOP • Aquous humor production & Composition • Biochemistry of aquous • Blood- aquous barrior • Types of aquous outflow • Mechanism of IOP maintenance		
9.VITREOUS: • Embryology & anatomy of vitreous • Biophysical aspects • Aging of vitreous • Physiology of vitreous body		
10. RETINA: • Embryology of retina • Functional organization of retina • Physiology of different parts of retina • Rod & cone photoreceptor pathways • Aging changes • Electrophysiology & retinal functions	**10**	**2**
11. VISUAL OBJECTIVES: • Specifications of stimulus • Physiological Factors • Objectives Criteria • Factors influencing visual Objectives • Binocular single vision • Stereopsis		
12. OPTIC NERVE: • Topographic anatomy • Microscopic anatomy • Blood Supply		

• Visual pathway • Axonal injury at different points along the Visual Pathway		
13. PUPIL: • Physiology of pupil • Clinical importance of pupil • Pathway of pupil light reflex & near pupil response • Relative afferent pupillary defect	**10**	**2**
14. EXTRAOCULAR MUSCLES: • Extraocular muscles gross anatomy • Extraocular muscles gross physiology		
15. CARNIAL NERVES RELATED TO EYE: • Anatomy of 3rd,4th,6th & 7th Cranial nerves • Intracranial & intra-orbital route of cranial nerves • Blood supply		
16. UVEAL TISSUE: • Gross anatomy of uveal tissue • Blood and nerve supply • Basic functions of different parts of uveal tissue • Orra Serrata • Limbus • Muscles Other than 6 EOMs		

Recommended Books

1. Khurana A.K, Anatomy and Physiology of Eye; CBS Publishers, India
2. Guyton, A.C & John E. Hall, Medical Physiology, 10th edition, Elsevier India, New Delhi 2004
3. Bhattacharya B, textbook of Visual Science and Clinical Optometry, Jaypee 2009
4. Adler's Physiology of Eye

Physical, Geometrical Optics & Instrument Optics

Credit Hours: 04 (2+2)

Learning Objectives:

- Provide comprehensive understanding of Fermat's principle, reflection, refraction laws, and wave nature in optics.
- Apply theoretical concepts to predict paths of reflected and refracted light rays and understand practical applications in image formation.
- Explain light behavior at planar, spherical surfaces, mirrors, lenses, calculating image distances, magnifications, and describing lens aberrations.
- Elaborate on wave nature, interference phenomena, diffraction, and interference in dielectric layers in the context of optics.
- Demonstrate proficiency in optical principles, instruments, calibration, maintenance, and upholding professional standards in patient care.

Contents	SEQs	MCQs
Principles of Radiant Energy	0.5	3
Emission spectra and black body		
Interference phenomenon		
Thin films, lens coating (interference)		
Polarization	0.5	3
Diffraction: light distribution in images		
Color: Spectrum, primary, equations, incandescence		
Luminance	0.5	3
Photometric principles, units, measurements		
Color temperature		
Photo-electric effect	0.5	3
Photo-chemical effect		
Reflection: Plane, spherical and parabolic mirror		
Refraction: Refractive index, Refraction at plane and spherical surfaces		
Spherical aberration	0.5	3
Vergence and surface power, reduced vergence and reduced thickness		
Coaxial system of spherical surfaces		
Critical angle, total internal reflection, fiber optics		
Prisms deviation dispersion and spectra	0.5	3
Magnification		
Cylinder, sphere and toric surfaces		
Back and front vertex power		
Eye as a camera	0.5	2
Optical characters of the eye		
Test Charts –	0.5	3
Stereo test		
Standard calculation of test charts		
Trial case lenses and accessories in the Trial Box		

Phoroptor		
Trial frame design		
Retinoscope – types		
Retinoscope – optics		
Autorefractors – principles and use	1	3
Indirect ophthalmoscope		
Direct ophthalmoscope		
Comparison of direct & indirect Ophthalmoscope		
Slit-lamp optics	1	4
Lensmeter		
Slit-lamp optics		
Potential Acuity Meter		
Slit lamp – methods of examination		
Glare and Contrast Sensitivity testing		

List of practicals

Practical	OSPE
• Clinical applications of Lensometer	06
• Performing Direct Ophthalmoscopy	
• Performing Indirect Ophthalmoscopy	
• Performing Retinoscopy	
• Slit lamp Illumination techniques	
• Basic ocular Measurement & Assessment using slit lamp	
• Fundus examination using slit lamp	
• Keratometry	
• Topography	
• Tonometer + Autorefractometry	
• Anterior segment Optical coherence tomography techniques, tests and their clinical relevance	
• Posterior segment Optical coherence tomography techniques, tests and their clinical relevance	

RECOMMENDED BOOKS

1. Theory and practice of Optics and refraction (By AK Khurana, fourth edition)
2. Clinical optics (By A.R. Elkiington, H.J. Frank, third edition)
3. Duke-Elder's Practice of Refraction (Revised by David Abrams, tenth edition)

Ocular Pathology-I

Credit hours: 03 (2+1)

Learning Objectives:

This course will enable students

- Identify with basic pathological factors involving the ocular tissue.
- Identify with pathological feature of all the ocular disease leading to morbidities.
- To be able to screen out the most common blinding diseases of anterior segments.
- To Explain basic ophthalmic workup.
- To identify a pathological condition & to Explain pathophysiology of disease.

Course contents

Topic	SEQ	MCQ
Examination Techniques		
Introduction		
Psychophysical tests		
Slit lamp biomicroscopy of the anterior segment		4
Tonometry		
Gonioscopy		
Central corneal thickness		
Orbit		
Preseptal cellulitis		
Orbital cellulitis		
Thyroid eye disease		
Approach to a patient with proptosis		
Proptosis		
Classification,Causes,Investigations)		
Enophthalmos		
Developmental Anomalies		
(craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome)	**1**	**10**
Orbital, cavernous sinus Thrombosis)		
Grave's Ophthalmopathy		
Orbital tumors(Dermoids, capillary haemangioma, Optic nerve glioma)		
Orbital blowout fractures		
Orbital surgery (Orbitotomy)		
Orbital tumors		
Orbital trauma		
Eyelids		**6**
Introduction		
Non-neoplastic lesions	**1**	
Benign epidermal tumours		
Benign pigmented lesions		

Benign adnexal tumours		
Miscellaneous benign tumours		
Malignant tumours		
Disorders of the eyelashes		
Allergic disorders		
Immune-related inflammation		
Bacterial infections		
Viral infections		
Blepharitis		
Ptosis		
Ectropion		
Entropion		
Miscellaneous acquired disorders		
Cosmetic eyelid and periocular surgery		
Congenital malformations		
Conjunctiva		**2**
Bacterial conjunctivitis		
Viral conjunctivitis		
Chlamydial conjunctivitis		
Ophthalmia neonatorum		
Acute allergic rhino conjunctivitis	**1**	
Vernal keratoconjunctivitis		
Atopic keratoconjunctivitis		
Phlyctenular keratoconjunctivitis		
Pterygium		
Pinguecula		
Xerophthalmia		
Lacrimal Drainage System		
Introduction Acquired obstruction		**1**
Congenital obstruction		
Chronic canaliculitis		
Dacryocystitis		
Dry Eye		
Introduction		
Sjögren syndrome		**1**
Clinical features		
Investigation		
Treatment		
Pupil		
Abnormalities of pupillary light reflex		
Coloboma of iris		
Anisocoria	**1**	**1**
Miosis		
Mydriatic		
Correctopia		
Polycoria		

Cornea		
Introduction		
Bacterial keratitis		
Fungal keratitis		
Herpes simplex keratitis		
Herpes zoster ophthalmicus		
Interstitial keratitis		
Protozoan keratitis		
Helminthic keratitis		
Bacterial hypersensitivity-mediated corneal disease		
Rosacea		**2**
Peripheral corneal ulceration/thinning		
Neurotrophic keratopathy		
Exposure keratopathy		
Miscellaneous keratopathies		
Corneal ectasia		
Corneal dystrophy		
Corneal degeneration		
Metabolic keratopathy		
Contact lenses		
Congenital anomalies of the cornea and globe		
Corneal and Refractive Surgery Keratoplasty		
Keratoprostheses		**1**
Refractive procedures		
Lens		
Acquired cataract		
Management of age-related cataract	**1**	**1**
Congenital cataract		
Ectopia lentis		
Abnormalities of lens shape		
Episclera and Sclera		
Anatomy		
Episcleritis		
Immune-mediated scleritis		
Porphyria	**1**	**1**
Infectious		
Scleritis		
Scleral discolouration		
Blue sclera		
Miscellaneous conditions		

List of Practical's

Particals	OSPE
• Performing Air puff and applanation tonometer.	03
• Ptosis assessment	
• Tests for central corneal thickness	
• Differentiating between bacterial, viral and allergic conjunctivitis	
• Assessment of common anterior segment ocular pathologies	
• Slit lamp Illumination Techniques	
• Anterior segment Assessment with slit lamp	
• Different Anterior segment tests with slit lamp such as Seidel test, Van Herick's method of grading anterior chamber depth, Schirmer test, Jones dye test, estimation of number of cells in anterior chamber and foreign body removal etc.	
• Grading and identifying different types of cataracts and posterior capsular opacification	
• Posterior segment Assessment of Central fundus and anterior vitreous with slit lamp	
• Posterior segment Assessment of peripheral fundus	

List of recommended books

- Kanski : 9th Edition
- Clinical Anatomy of the Eye(Snell's): 22nd Edition
- Parson's diseases of the Eye

Ocular Pharmacology

02 (2+0) Credit Hours

Learning Objectives:

At the end of Module, students would be to Explain the

- Basic Pharmacological Principals involved in drug selection
- administration, management of the dose
- adverse effects, contraindications and toxicity handling.

Course Content

TOPIC	SEQS	MCQS
Introduction to ophthalmic pharmacology	1	2
Passages of ophthalmic drugs		
Cycloplegics & mydriatics (mechanism of action)		4
Uses of cycloplegics & mydriatics, side effects		
Antibiotics (introduction)	1	4
Antibiotics (types & uses)		
Topical anesthetics		
Anti-allergic	1	4
Anti-glaucoma drugs		4
Steroids		4
Anti-inflammatory drugs		4
Adverse reactions and Side Effects – Antibiotic Drugs	1	2
Adverse reactions and Side Effects – Anti Glaucoma Drugs, Beta Blockers		4
Adverse Reactions of other Ophthalmic Drugs –		2
Diagnostic Stains: Fluorescein, Rose Bengal	1	4
Pharmacotherapy of Ocular patients	1	1
Ophthalmic Drug Formulations	1	2
Pharmaceutical and Regulatory aspects	1	2
NSAIDS	1	2

RECOMMENDED BOOKS

- Clinical Ocular Pharmacology (BARTLETT JANNUS) 5TH Edition
- Ocular Theraputics by Ashok Garg 3RD Edition
- Ocular Therapeutic Handbook (A Clinical Manual) Bruce E. Onofrey 2nd Edition
- Lippincott illustrated Reviews Pharmacology Sixth Edition

Orthoptics-I

03 (2+1) Credit hours

Learning Objectives:

At the end of this course students will be able to

- Define binocular single vision
- Explain ocular motility and disorders
- Understand clinical approach of squint patients
- Explain amblyopia and its latest treatment modalities and nystagmus.

Course content

Topic	SEQ	MCQ
Ocular motility and dysfunctions	**2**	
Disorders of ocular motility		2
Investigating motility disorders		1
Functions of extra ocular muscles		1
Amblyopia		4
Latest treatment modalities in amblyopia		1
Nystagmus		1
Binocular single vision	**2**	
Diplopia		2
ARC		2
Investigation of heterophoria		2
Investigation of commitant deviation		1
Investigation of incommitant deviation		1
Convergence anomalies		1
Management of phorias		1
Common orthoptic procedures	**2**	
Visual acuity		1
Visual acuity assessment in pre-verbal		1
Visual acuity assessment in Toddler		1
Visual acuity assessment in school going children		1
Visual acuity charts, testing distance, principle		1
Cover uncover test		1
Principles		1
Procedure		1
Results Interpretation		1
Extra ocular motility testing		
Procedure		

Types of Extra ocular motility		
Near point of convergence		
Krimsky		1
Principles		
Procedure		
Results		

List of practicals	OSPE
• History Taking	03
• Cover test, Uncover test and alternate cover test	
• Methods of Visual acuity Measurement & Assessment in orthoptic children and adults	
• Learning clinical differences between saccadic, smooth pursuit movements, vergence, vestibular and optokinetic movements	
• Measurement of amplitude of accommodation and convergence	
• AC/A ratio and its measurement	
• Tests for checking retinal correspondence such as bagolini glasses, Worth's four dot test, after image test, Prism adaption and vertical prisms test	
• Measurement & Assessment sensory fusion	
• Measurement & Assessment motor fusion	
• Tests for stereopsis	
• Tests for suppression	

RECOMMENDED BOOKS

- Binocular vision anomalies, (5th edition, Pickwells)
- Binocular vision and anomalies (Bruce evan)
- Clinical management of binocular single vision, (Second edition, Mitchell scheiman)
- Clinical Orthoptics (Fiowna Rowe)

Neuroanatomy

03 (2+1) Credit Hours

Learning Objectives:

After completing this course students will be able to

- Develop a profound grasp of neuroanatomy, encompassing foundational concepts, brain anatomy, visual pathways, and cranial nerves relevant to optometry.
- Explore the interconnectedness of eye structures with neural pathways, emphasizing the relationship between the retina, optic nerve, and visual cortex.
- Apply neuroanatomical knowledge to diagnose and treat vision and neurological disorders. Interpret neurological findings in ophthalmic examinations and clinical scenarios.
- Explore the use of advanced imaging techniques like OCT and MRI in explaining neuroanatomy and diagnosing neurological conditions related to the eyes.
- Equip Optometrists and Orthoptists with essential knowledge and skills for comprehensive eye care, focusing on managing neurological conditions affecting vision.

Topic	SEQ	MCQ
Introduction to Neuroanatomy for Optometrists and Orthoptists:	0.5	1
Basic concepts and terminology specific to neuroanatomy related to vision.		2
Gross Brain Anatomy for Optometrists and Orthoptists:		2
The structure of the brain regions involved in vision, including the visual cortex.	0.5	1
Vascular supply of brain	0.5	1
The roles and functions of these regions in visual processing.		1
Visual Pathways:	0.5	
Detailed examination of the visual pathways from the eye to the brain.		1
Explaining the transmission of visual information from the retina to the visual cortex.		1
Cranial Nerves Relevant to Optometry:	0.5	
In-depth study of cranial nerves that play a crucial role in vision and eye movement.		1
Detailed examination of the optic nerve (CN II), oculomotor nerve (CN III), trochlear nerve (CN IV), and abducens nerve (CN VI).	0.5	1
Anatomy of the Eye in Relation to Neuroanatomy:	0.5	
How the eye structures are connected to neural pathways.		**1**
The relationship between the retina, optic nerve, and visual cortex.		1
Neurological Basis of Vision Disorders:		1
The anatomical and physiological basis of common vision disorders seen in ophthalmology /Optometry practice.		1

Explaining how neural abnormalities can lead to vision problems.		1
Visual Field Anatomy and Testing:		**1**
Anatomy of the visual field and its significance in optometry.		1
Methods and techniques for assessing visual fields and interpreting results.	0.5	1
Pupillary Reflexes and Ocular Motility:	1	1
How neural pathways control pupil size and eye movements.		**2**
The neurological basis of pupillary reactions and eye muscle function.		1
Neurological Disorders Affecting Vision:		
In-depth exploration of neurological conditions that can impact vision, such as optic neuritis, stroke, and neurodegenerative diseases.		**1**
The role of Optometrists and Orthoptists in diagnosing and managing these conditions.		1
Ocular Imaging and Neuroanatomy: - The use of advanced imaging techniques like optical coherence tomography (OCT) and magnetic resonance imaging (MRI) in Explaining neuroanatomy and diagnosing eye-related neurological conditions.		2
Neuroanatomy in Clinical Practice: - Application of neuroanatomical knowledge in ophthalmic examinations and diagnostics. - Neurological assessments for eye patients and the interpretation of findings.	1	2

Practical	**OSPE**
Dissection and identification of major brain structures and nerves relevant to optometry	03
Identification of visual pathways from the eye to the visual cortex	
Visual field defects and their clinical significance	
Visual field Assessment	
Pupillary reflex assessment	
Pupil abnormalities	
Ocular motility assessment	
Optical Coherence Tomography (OCT)	
Clinical Interpretation of different imaging modalities (MRI & CT) in diagnosing common ophthalmic neurological disorders.	
Case studies and clinical scenarios	

RECOMMENDED BOOKS

- Essentials of Anatomy and Physiology by Seelay, Stephens and Tate (4th edition)
- Ross & Wilson Anatomy and Physiology.

Clinical Medicine In Optometric Practice-I

Credit Hours: 03 (03+0)

Learning Objectives:

After completing this course students will be able to:

- Provide optometry students with a comprehensive understanding of systemic diseases and their ocular manifestations, fostering the ability to integrate medical decision-making into optometric practice.
- Offer an optometry-centric exploration of systemic diseases, emphasizing clinical presentations, diagnostic evaluations, and relevant background information, including physiology and epidemiology.
- Enable students to analyze clinical findings across various fields, such as optometry, general medicine, medical specialties, radiology, neurology, and dermatology. Emphasize a holistic approach to understanding the patient's history and examination for a thorough differential diagnosis.
- Empower students to make informed decisions regarding optometric treatment, testing, medical referral, or a combination thereof, based on a careful analysis of clinical features. Encourage critical thinking for individualized patient care.
- Equip optometry students with the necessary knowledge and skills to transition seamlessly from optometry school to postgraduate training and clinical practice, emphasizing the practical application of systemic medicine in the optometric context.

Topic	SEQ	MCQ
Evidence----Based Medicine and the Medical Literature		1
1: Principles of Laboratory Investigation	1	1
Reporting of Laboratory Values: Sensitivity and Specificity		1
Influential Factors on Laboratory Test Results		1
The Concepts of Primary and Secondary Prevention	1	1
2: Hypertension	1	1
Definitions of Hypertension		1
Diagnosis of Hypertension		1
Essential and Secondary Hypertension & Management		1
Hypertensive Urgency and Emergency		1
Clinical Impacts of Hypertension		
Diabetes Mellitus and Systemic Complications		1
Diabetes Classification	1	1
Pathophysiology: Hormones and Glucose Homeostasis		1

Insulin Deficiency and Ketone Production		1
Insulin Resistance		1
Hypoglycemia		1
Diagnosis and Medical Testing in Diabetes		1
Clinical Presentation of Diabetes		
Thyroid		
Hypothyroidism		1
Hyperthyroidism		1
Thyroid Eye Disease		
Thyroid Cancer	1	
Calcium and Osteoporosis		1
Hyper---- and Hypocalcemia		
Osteoporosis		
Extraintestinal Manifestations		1
Diagnosis		
Prognosis and Treatment		
Hematology and Oncology		1
Hematology		
Lab Testing in Hematology		1
Diseases of Formed Elements of the Blood		
Disorders of Red Blood Cells		1
Oncology		
Cancer Epidemiology		
Cancer Screening		1
Cancer Risk Factors		1
Cancer Treatment		1
Immunotherapy		1
Ocular Manifestations in Systemic Cancer		1
Cancer Metastasis to the Globe, Orbit, and Efferent Visual Pathway		
Paraneoplastic Disease of the Globe and Efferent Visual Pathway		1
Talking About Cancer		
Infectious Diseases	1	1
Clinical Syndromes	1	
Sinusitis		1
Cellulitis		1
Orbital Cellulitis		
Preseptal Cellulitis		
Meningitis and Encephalitis	1	1
Sepsis		1
Pathogens		

Tuberculosis		1
Herpesvirus		1
Herpes simplex virus type 1 and 2		1
Varicella--zoster virus		1
Human herpesvirus 8		1
Molluscum contagiosum		1
Toxoplasmosis	1	1
Rubella		1
Syphilis		1

Allied Health Sciences
Curricula 2024

BS SPEECH & LANGUAGE PATHOLOGY
CURRICULUM

Scheme of Studies

Semester	Course Code	Course Titles	Theory	Practical	Total Credit Hours
1st Semester	GEFE	Functional English	03	0	03
	GEQR	Quantitative Reasoning-I	03	0	03
	GENS	Natural Sciences	02	1	03
	GEAH	Arts and Humanities	02	0	02
	GEIE	Islamic Studies/Ethics	02	0	02
	IDC	Basic Biochemistry	03	0	03
	PERL-I	PERL-I	01	0	01
Credit Hours					**17**
2nd Semester	GEEW	Expository Writing	03	0	03
	GEQR	Quantitative Reasoning-II	03	0	03
	GESS	Social Sciences	02	0	02
	GEICP	Ideology and Constitution of Pakistan	02	0	02
	IDC	Basic Anatomy	03	0	03
	IDC	Basic Physiology	03	0	03
	BS BCP 115	Behavioral Sciences	02	1	03
	BS SLP 105	Introduction to Speech & Language Pathology	03	0	03
	PERL-II	PERL-II	01	0	01
Credit Hours					**23**
3rd Semester	GEE	Entrepreneurship	02	0	02
	GECCM	Citizenship Education and Community Engagement	02	0	02
	GEICT	Applications of Information and Communication Technologies (ICT)	02	1	03
	IDC	General Pathology	03	0	03
	BS DP 200	Developmental Pediatrics-I	02	0	02
	BS PC/BSMS 202	Medical & Surgical	02	01	03
	BS PSLP 201	Basic Phonetics & Phonology	02	01	03

	PS	Pakistan Studies	02	0	02
	EPC-I	English Proficiency-I	02	0	02
	PERL-III	PERL-III	01	0	01
Credit Hours					**23**
4th Semester	BS HS 211	Audiology& Speech Rehab	02	1	03
	BS LD 212	Developmental Language Disorder	02	1	03
	BS LP 112	Linguistic	02	01	03
	BS SD 204	Speech Disorder-I	02	1	03
	BS DP 201	Developmental Pediatrics-II	02	0	02
	BS PSC 216	Clinical supervised practice-1	0	01	01
	EPC-2	English Proficiency-2	02	0	02
	PERL-IV	PERL-IV	01	0	01
Credit Hours					**18**
5th Semester	BS NLD 300	Adult Neurogenic Language Disorders	02	1	03
	BS CLP 215	Clinical Linguistics & Clinical Phonology	02	1	03
	BS PHP 203	Psychiatry & Human Psychology	02	0	02
	BS SDF 213	Speech Disorder-II	02	1	03
	BS DR 303	Developmental Rehabilitation	02	1	03
	BS PSC 304	Clinical Supervised Practice-II	0	2	02
	EPC-3	English Proficiency-3	02	0	02
	PERL-V	PERL-V	01	0	01
Credit Hours					**19**
6th Semester	BS OMS 311	Oral Motor Speech Disorders	02	01	03
	BS VD 301	Speech Disorders-III	02	01	03
	BS LD 312	Learning Disorders	02	01	03
	BS CDM 313	Clinical Decision Making	02	01	03
	BS PSC 314	Clinical Supervised Practice-III	0	02	02
	BS RM 315	Research Methodology	03	00	03
	EPC-4	English Proficiency-4	02	0	02

	PERL-VI	PERL-VI	01	0	01
Credit Hours					**20**
7th Semester	BS CPD 400	Craniofacial Abnormalities	02	01	03
	BS SD 401	Feeding & Swallowing Disorders	02	01	03
	BS AAC 402	Alternative & Augmentative Communication	01	01	02
	BS BS 403	Bio Statistics	02	01	03
	BS MI 404	Medical Imaging for Speech and Language Pathology	02	01	03
	BS PCC 404	Clinical Supervised Practice-IV	0	02	02
	EPC-5	English Proficiency-5	02	0	02
	PERL-VII	PERL-VII	01	0	01
Credit Hours					**19**
8th Semester	BS PEA 412	Professional & Ethical Aspects of Speech Therapy	03	00	03
	BS PCS 413	Clinical Supervised Practice-V	0	03	03
	BS EBP 414	Evidence Based Practice	02	01	03
	BS PH 407	Pharmacology	2	0	02
	BS ID 415	Capstone Project	0	03	03
	EPC-6	English Proficiency-6	02	0	02
	PERL-VIII	PERL-VIII	01	0	01
Credit Hours					**17**

Developmental Pediatrics-I

Credit Hour 02 (2+0)

Objectives & learning Outcomes:

By the completion of this course, students will be able to:

- Comprehensive History and Examination:
    - Accurately elicit and document a complete pediatric history, covering identifying data, chief complaints, developmental milestones, and family history, perform physical and neurological examinations, including assessments of cranial nerves, oral motor functions, and the musculoskeletal system.
- Knowledge of Disorders:
    - Identify developmental and neurological disorders and their differential diagnosis.
    - Identify and explain the impact of neurological and medical conditions on a child's growth and development.
- Diagnostic and Management Skills:
    - Recognize and manage common and significant pediatric medical issues using evidence-based strategies.

Course Content	30 Mcqs	6 Seqs
Theories of early development • Psychosocial theory • Cognitive developmental theory • Behavioral theory	5	1
Cranial anatomy & functions of cranial nerves • Function of the cranial nerves, focusing on V, VI, VII, X and XII • Anatomy and development of the teeth and the bite • Oral motor function and the development of primitive reflexes. • Normal swallowing in children	10	2
• The normal somatic, psychomotor and psychological development of the child. • Complications during pregnancy and delivery which are of significance to the health and development of the child.	5	1

• Brain damage and its origin in children. • Deviations in neuro-motor and sensory development.		
• Developmental disorders and differential diagnosis. • Cerebral palsy • Epilepsy • Global developmental delay. • Intellectual Disability • Attention deficit disorders • Autism Spectrum Disorders • Down syndrome • Syndromes specific to Speech	5	1
• Neurological & genetic disorders in children developmental delay. • Other conditions which may affect the child's development or lead to permanent disability.	5	1

Recommended book

- Basis of Pediatrics by Pervez Akbar Khan - 11th Edition

Medical & Surgical

Credit Hour 03 (2+1)

Objectives and Learning Outcomes:

After the completion of this course the student will be able:

- Understand the basic pathology, symptomatology, management and potential communication impacts of neurological & respiratory diseases.
- Identify how chronic respiratory conditions affect speech and breathing patterns essential for phonation and articulation.
- Recognize the implications of brain damage, cranial nerve dysfunction (V, VII, IX, X, XI, XII) and motor neuron diseases on speech and language.
- Differentiate between symptoms of upper and lower motor neuron lesions, extrapyramidal disorders, and cerebellar dysfunction to assess communication impairments effectively.
- Address communication challenges caused by age-related conditions such as stroke (CVA), transient ischemic attacks (TIA), Alzheimer's, and Parkinson's disease.
- Understand the anatomy, physiology, basic pathology, symptomatology and management of ENT Disorders,
- Identify ENT disorders impacting speech, including laryngeal pathologies, tonsil and adenoid diseases, and tumors.
- Use examination methods to assess and treat voice disorders, including surgical and non-surgical voice rehabilitation techniques
- Support patients undergoing surgery for cancer of the larynx or alternative voice restoration methods, ensuring effective communication post-surgery.

Outline	**MCQ**	**SEQ**	**OSPE**
Disease of the Respiratory Tract (Only Basic Introduction) • Bronchitis • Bronchiectasis • Pleurisy • Empyema • Emphysema • Pneumonia • Lung abscess • Tuberculosis of the lungs	04	01	0.5

• Asthma, hay fever			
Diseases of the Nervous System: (Only Basic Introduction) • Symptomatology of brain damage – different types and locations e.g. stroke, tumours and trauma • Effect of damage to cranial nerves numbers V, VII, IX, X, XI & XII • Visual field defects • Disturbances of cerebellar function • Differential symptomatology of lesions of upper motor neurons • Lower motor neuron • Extra pyramidal system • Cerebellum and sensory system • Acute infections, Poliomyelitis, encephalitis and Herpes zoster • Parkinsonism • Hemiplegia • Neuropathies • Facial paralysis • Neuralgia • Muscular atrophies • Motor neuron disease • Muscular dystrophies • Friedrich's ataxia	08	01	01
Diseases with consequences on communication in the elderly population • CVA • TIA • Delirium • Alzheimer's disease • Parkinson's disease	03	01	0.5
Otorhinolaryngology • Diseases of Ear, Nose & Throat relevant to speech and language pathology • Examination methods • Throat diseases, focusing on diseases of the tonsils and adenoids • Symptomatology, diagnosis and treatment of diseases of the larynx	15	03	01

• Alternative surgical techniques for voice improvement • Conservative and radical surgery for cancer of the larynx • Tumors of nose, sinuses, oral cavity and larynx relevant to speech and language pathology			

Recommended Books:

- Practice of Medicine by Davidson
- Practice of Medicine by Inaam Danish
- Diseases of Ear, Nose & throat by shruti Dhingra

Basic Phonetics & Phonology

Credit Hour 03 (2+1)

Objectives & Learning outcomes:

By the completion of this course students will be able

- Explain the difference between phonetics and phonology and Identify key phonological concepts.
- Use theories of phonological analysis to understand speech patterns.
- Analyze segmental and supra-segmental phenomena.
- Conduct phonological assessments using tools like phonetic and phonemic transcription to evaluate speech production in different languages, including Urdu and English.
- Understand articulatory, acoustic, and auditory phonetics.
- Perform phonetic transcription using IPA charts, emphasizing Urdu and English sounds, to assess speech clarity and production.
- Analyze the physics of sound production and perception, including the source-filter theory, to understand the acoustics of speech.
- Identify and address consonant and vowel articulation issues, including place and manner of articulation.
- Understand and explain the different air-stream mechanisms.
- Supra-Segmental Features and Their Clinical Relevance
- Compare and analyze language-specific phonotactics and supra-segmental patterns to provide culturally sensitive therapy.
- Utilize IPA for precise transcription and analysis of speech sounds

Outline	MCQ	SEQ
<u>Phonology</u> • What is phonology • Difference between phonetics and phonology • Major Concepts of phonology Theories of Phonological Analysis • Structure of system • Prosodic analysis • Phonemics • Distinctive features theory • Generative phonology	7	01
The phonology of English & Urdu Segmental & supra-segmental Phenomena:	8	02

• Units of phonological structures that make segments • Features as independent coordinated elements • Features and natural classes • Processes and allophonic variation • Laryngeal features • Place features • Dorsal features • Manner features • Phonological features • Contrastive, descriptive, classificatory function of phonological features • Urdu consonant features • Urdu vowel features • Derivations and rule ordering • Phonological rules and their types/processes		
<u>Phonetics</u> • Phonetics and its branches • Speech mechanism • Placement, Manner & Voicing of Vowels & consonants	10	02
IPA (Transcription practice based) • Background and significance in speech therapy. • IPA charts of Urdu & English languages of Pakistan, • Urdu orthography and its relationship with phonemic transcription • Phonetic vs. phonemic transcription • Use of diacritics for narrow/phonetic transcription	5	1

Practical	OSPE
• IPA Chart Utilization: Practice transcription of words using the International Phonetic Alphabet (IPA). • Phonetic Transcription Exercise: Conduct narrow and broad transcriptions of given speech samples. • Air-Stream Mechanisms Exploration: Demonstrate pulmonic, glottic, and velaric airstream mechanisms • Vowel Quadrilateral Mapping: Plot vowels on a quadrilateral diagram based on height, backness, and rounding. • Consonant Articulation: Analyze the placement and manner of articulation for consonants in Urdu and English. • Real-Life Case Study Analysis: Transcribe speech from real-life clients using IPA	03

Recommended Books:

- A Text Book of Linguistics and Phonetics by Dr A.S.B Timuric
- Introductory Phonology by Bruce Hayes
- Phonology: The function and patterning of sounds by Michael Dobrovolsky

Audiology & Speech Rehabilitation

Credit Hours: 03(2+1)

Objective & learning Outcomes:

After completion of this course student will be able to

- Understand the requirements of the speech-language pathologist as they relate to audiologic services.
- Review the speech-language pathology scope of practice as it pertains to audiological services and
- service provision to those with hearing loss.
- Discuss the concept of collaboration and understand its importance.
- Describe the characteristics of sound.
- Identify the anatomy of the auditory system and trace the transmission of sound throughout.
- Differentiate the types of hearing loss an abnormality in the auditory system can cause.
- Classify hearing impairments and conduction of comprehensive audiometric evaluations for adults and children.
- Assess candidacy for cochlear implants in children and adults.
- Develop pre -and post-implantation rehabilitation programs, focusing on auditory and speech skills.
- Design auditory training programs using analytic and synthetic approaches.
- Develop rehabilitation plans for hearing-impaired preschool children, school-aged children, and adults.
- Plan and execute intervention strategies for children and adults based on individualized needs.

Outline	MCQ	SEQ
Sound and the Ear Hearing: • Auditory behaviors as a function of development level. • Levels of, auditory skill development, • Role of audition in language development, • Listening /learning environment and strategies for facilitating listening skills. • Linguistic factors: speech sound production features, sentence structure/syntax, semantics/meaning/content/, pragmatics,	5	1

• Other factors: context cues, clear speech and acoustic highlighting, improving speech to noise ratio, reading/storytelling, family interaction • Hearing impairment in adults and children, their causes, origin and classification. • Acoustic/physiological concepts (e.g. auditory threshold, range of hearing) and Psycoacoustic concepts (hearing threshold, hearing level) • Hearing measurement. • Technical assistive devices and hearing aids.		
The nature of Hearing loss: Conductive, sensorineural & mixed hearing loss • Hearing measurement in adult and child audiometry • Audiological management of hearing loss • Overall hearing decrease o Ability to perceive speech • Tinnitus • Mainers disease o Hearing loss • Impaired ability to communicate • Hearing aids may not restore hearing to normal • Cochlear Implants And Children • Candidacy, Implant description & Benefits • The Speech-Language Pathologist in Audiology Services: An Interprofessional Collaboration	10	2
Auditory training: • Candidacy for auditory training, • Four designs principle (auditory skill, stimuli, activity type, difficulty level) • Developing analytic training objectives, • Vowel auditory training objectives, • Consonant auditory training objectives • Formal and informal auditory training, • Sound awareness, identify, discrimination, • attach meaning to sounds, • Ability to distinguish one word from another using any remaining hearing. • developing skills in hearing with hearing aids and assistive listening devices • Handle easy and difficult listening situations. • The effect of hearing impairment on language, speech and voice • Early diagnosis of hearing impairment children	5	1

• Teaching, treatment and rehabilitation of pre-school children with impaired hearing • Special education of school children with impaired hearing • Aural rehabilitation of adults • Parent education, guidance and counseling • Special problems of the elderly hearing-impaired person • Pedagogical methods in hearing training and lip reading • Sign language from a methodological and linguistic presentation		
Speech reading: • Speech reading for communication, • Difficulty of lip-reading task, • Importance of residual hearing, • Factors affecting speech reading process, • Speech reading training	5	1
Intervention plans for children & adults: • Decisions about intervention programmed, • Communication mode in School classes • Factors influencing intervention decisions • Visual Cues: • All kinds of visual cues that give meaning to a message, Speaker's facial expression, body language, context, Cochlear Implants and Children • Speech-language pathologist evaluation and rehabilitation • Categorization of pre-implantation speech and language skills. • Post-cochlear implantation rehabilitation programs (auditory training) • Speech and voice training • Visual/auditory processing (lip-reading, facial expression, gestures, and body language)	5	1

Practical	**OSPE**
Practical 1 :Auditory Skill Development Assessment Objective: Evaluate auditory behaviors at different developmental stages using structured observation techniques. Tool: Auditory Behavior Checklist.	03

Practical 2: Post-Cochlear Implant Rehabilitation Objective: Design and implement auditory training programs for individuals with cochlear implants. Tool: Real-life case study simulations.	
Practical 3: Auditory Discrimination Exercises Objective: Train students to teach clients how to discriminate between different speech sounds. Tool: Auditory Training Kits.	
Practical 4 :Designing and Implementing Vowel and Consonant Training Programs Objective: Create specific objectives for vowel and consonant recognition and practice. Tool: Phoneme Discrimination Software.	
Practical 5 :Rehabilitation for Preschool Children Objective: Develop age-appropriate therapy plans for children with hearing impairments. Tool :Early Childhood Intervention Kits.	

Recommended books:

- Sound and the Ear Karen J. Kushla, scd, CCC-A, FAAA
- The Speech-Language Pathologist in Audiology Services: An Interprofessional Collaboration
- Advances in audiology and hearing science (volume 1) stavros hatzopoulos, Phd
- Advances in audiology and hearing science Volume 2 by *Otoprotection, regeneration, and telemedicine*
- Co Chlear Implants: Audiologic Management and Considerations for Implantable Hearing Devic by jace wolfe
- Human Communication Disorders: An Introduction (8th Edition by Noma B. Anderson , George H. Shames)

Developmental Language Disorders

Credit Hours: 3(2+1)

Objectives:

After completion of this course the students will be able to:

- Identify characteristics associated with receptive and expressive language disorders in the preschool population.
- enumerate etiological factors leading to preschool communication disorders
- Demonstrate knowledge of the methods of assessing language abilities, interpreting assessment data and developing goals and objectives for intervention.
- Define the terms communication, language, and speech as they relate to human as well as to non-human communication skills.
- Understand how caregivers can positively affect the acquisition of communication, language, and speech.
- Demonstrate knowledge of language development by systematically analyzing a child's language skills for MLU, and by informally estimating skills in the areas of phonology, morphology, syntax, and pragmatics.

Outline	**MCQ**	**SEQ**	**OSPE**
• Language & human commination • Normal developmental milestones • Toddlers and preschoolers with specific language impairment • Identification of children with language impairment • Mental, chronological & language age • Clinical markers for SLI • Challenges and changeling in child's language performance • Language delay versus disorder • Language characteristics of SLI children's • Implementation for intervention	8	2	1
Children with acquired language disorder • Types of acquired brain injury • Language development and language recovery	8	1	1

• Difference between developmental & acquired language disorders in children • Assessments & interventions Language & linguistically culturally diverse children			
Language interventions • Language & augmentative & alternative communication • Approaches to & purposes of the language assessment Considerations for language interventions	9	2	0.5
Selective mutism Causes, symptoms, assessment & intervention	5	1	0.5

Recommended book:

- An introduction to children with language disorders 5th edition by Vicki A. Reed.
- Human Communication Disorders: An Introduction (8th Edition) by Noma B. Anderson, George H. Shames

Linguistic

Credit Hours: 3(2+1)

Objective & learning outcomes:

After completion of this course the students will be able to:

1. General education and knowledge about language that is critical for understanding its place in the human world, both socially and psychologically;
2. Express, assess, and defend analyses of linguistic data or societal concerns related to language use, with clarity and rigor in standard written academic English & Urdu
3. Effectively analyze the structure of languages, as manifested in their phonological, morphological, syntactic, and/or semantic systems; and
4. Effectively utilize a standard scientific research methodology appropriate to linguistic analysis.

Outline	MCQ	SEQ	OSPE
Language & Communication • An Introduction • Definition of Language • Characteristics of Language • Human and animal communication • Definition of Communication • Types of Communication	4	1	
Components of Linguistics • What is linguistics? • Is linguistics a science? • The scope of linguistics • Linguistic levels • The structure of language • Linguistics and related fields • Descriptive, Historical and Comparative Linguistics • Some major linguistic concepts • Synchrony and Diachrony • Substance and form • Syntagmatic and paradigmatic	4	1	

Urdu & English Morphology • Morphemes and their types • Allomorphs Representing Word Structure • Roots and affixes, • Bases • Morphological phenomena • Morphological representations word classes Compounding Other Forms Of Words Formation Phenomena of inflection in • Number, • Noun case, • Pronoun, • Tense marking • Gender • Respect	6	1	01
Urdu & English Syntax Phrase Structure • Phrase structure rules Tests For Phrase Structure Compliment Options • Inversion • Who movement • Constraints on transformation Deep Structure And Surface Structure Additional Structural Patterns Types Of Syntactic Analysis • Passive structures • Relational analysis • Functional analysis Grammatical analysis (Argument structure) Urdu Syntax) Language Data Analysis Base Sentence Types and Internal Structure	8	02	01
The Nature of Meaning & Use of language • Semantic relations among words Semantic Relations Involved In Sentences • Componential analysis • Meaning and concepts The Conceptual System	8	1	01

• Fuzzy concepts and graded membership • Metaphor • The lexicalization of concepts • The grammaticization of concepts • Thematic roles • Thematic role assignment • Deep structure and thematic roles • Passive • Interpretation of pronouns Other Factors In Sentence Interpretation Maxims of conversation			

Recommended Books:

- A Text Book of Linguistics and Phonetics by Dr A.S.B Timuric
- Introductory Phonology by Bruce Hayes
- phonology: The function and patterning of sounds by Michael Dobrovolsky

Speech Disorders I (Articulation and Phonological Disorder)

Credit Hours: 3(2+1)

Objectives:

After completion of this course the students will be able to:

- Define and explain the types and characteristics of phonological processes, Differentiate between typical and atypical phonological processes.

- Recognize and describe the features and presentation of phonological disorders& Understand the developmental patterns and deviations in phonology.

- Analyze the determinants of phonological disorders, including genetic, environmental, and neurological factors.
- Evaluate the influence of speech environment and cognitive factors on phonological development.

- Perform phonological assessments using standardized tools and informal measures.
- Identify errors and patterns in speech production to diagnose phonological disorders.

- Compare and contrast phonological disorders with other speech disorders, such as articulation and motor speech disorders.
- Apply diagnostic frameworks to ensure accurate identification of phonological disorders.

- Design evidence-based intervention plans targeting specific phonological disorders.
- Utilize strategies for phonological awareness and production enhancement.
- Monitor and evaluate therapy progress and adapt intervention strategies as needed.

- Work alongside educators, audiologists, and psychologists to provide holistic care for clients with phonological disorders.
- Guide and support families in understanding and managing phonological challenges in children.

Outline	MCQ	SEQ	OSPE
Articulation Disorders • Definition • Different forms of articulation disorders • Site of articulation disorders • Manners of articulation disorders • Assessment and Management	15	3	1
Toddlers and preschoolers with specific language impairment	5	1	1
Phonological Disorder:	10	2	1

• Phonological process types of phonological process • Types of phonological process • Nature of phonological disorder • Determinants of phonological disorders • Assessment • Differential Diagnosis of Phonological Disorders • Intervention			

Recommended book:

- An introduction to children with language disorders 5th edition by Vicki A. Reed
- Human Communication Disorders: An Introduction (8th Edition)
- The Allyn & Bacon Communication Sciences and Disorders Series 8th Edition by Noma B. Anderson, George H. Shames

Developmental Pediatrics -II

Credit Hours: 3(2+1)

Objectives:

By completion of this course the student will be able to:

Assessment Objectives

- Develop skills to assess and diagnose Cerebral Palsy, Epilepsy, and Global Developmental Delay through comprehensive neurological and developmental evaluations.
- Identify and evaluate the degree of Mental Retardation, understanding its impact on functional abilities and quality of life.
- Recognize signs and symptoms of Disruptive Behavior Disorders and Attention Deficit Disorders using standardized diagnostic tools and behavioral assessments.
- Conduct thorough assessments of Autistic Spectrum Disorders (ASD) focusing on social communication, behavioral patterns, and sensory processing issues.
- Perform diagnostic evaluations for Down Syndrome, including physical features, genetic testing, and associated developmental challenges.
- Understand the structure, goals, and coordination of child healthcare services within the medical sector for effective management.

Management Objectives

- Formulate individualized treatment plans for children with Cerebral Palsy to improve motor function, communication, and independence.
- Develop evidence-based protocols for the medical and behavioral management of Epilepsy and associated developmental delays.
- Apply therapeutic techniques, including Behavior Modifications, to manage Disruptive Behavior Disorders and Attention Deficit Disorders effectively.
- Integrate structured interventions, such as Applied Behavior Analysis (ABA) and speech therapy, into the management of Autistic Spectrum Disorders (ASD).
- Address the specific needs of children with Down Syndrome, including early intervention strategies, speech therapy, and educational planning.

- Implement rehabilitative procedures for disabled children, incorporating physical therapy, occupational therapy, and assistive devices to maximize functionality.
- Plan and execute family-centered care models to provide holistic support to children with developmental challenges and their families.

DEVELOPMENTAL PAEDIATRICS

Documentation & Management of the following disorders

- Cerebral palsy, epilepsy and global developmental delay.
- Mental Retardation
- Disruptive Behavior Disorders
- Attention deficit disorders
- Autistic Spectrum Disorders
- Down syndrome

The organization and work of child healthcare services in the medical sector.

- Assessment and therapeutic procedures for rehabilitation of disabled child.
- Behavior Modifications

Outline	MCQ	SEQ	OSPE
Assessment & management Cerebral palsy, epilepsy and global developmental delay	5	1	03
Assessment & management attention deficit disorders	5	1	
Assessment & management Autistic Spectrum Disorders	10	1	
Assessment and therapeutic procedures for rehabilitation	5	1	
Behavior Modifications	5	2	

Recommended book

- Basis of Pediatrics by Pervez Akbar Khan - 11th Edition

Supervised Clinical training practice-I (0+2)

Introduction to Clinical Settings:

- Familiarize students with clinical environments, including therapy rooms, diagnostic equipment, and patient management systems.
- Observe the workflow and role of speech-language pathologists in different settings (e.g., hospitals, schools, rehabilitation centers).

Understanding Patient Interaction:

- Develop communication skills to interact professionally with patients, caregivers, and interdisciplinary team members.
- Learn to build rapport and establish trust with patients and their families.

Observation and Documentation:

- Observe therapy sessions and diagnostic evaluations conducted by senior therapists.
- Learn accurate and detailed documentation of patient histories, evaluation results, and therapy progress.

Allied Health Sciences

Curricula 2024

DOCTOR OF PHYSICAL THERAPY

CURRICULUM

DOCTOR OF PHYSICAL THERAPY (DPT), PROGRAMF

Sr #	COURSE CODE	COURSE TITLE	THEORY	PRACTICAL	CREDIT HOURS
1st Semester	GEFE	Functional English	3	0	3
	GEQR	Quantitative Reasoning-I	3	0	3
	GENS	Natural Sciences (Med-Physics)	2	1	3
	GEAH	Arts and Humanities (Behavioral Sciences)	2	0	2
	GEICP	Ideology and Constitution of Pakistan	2	0	2
	IDCA-I	Anatomy-I	2	1	3
	IDCP-I	Physiology-I	2	1	3
	MCK-I	Kinesiology-I	2	0	2
	PERL-I	PERL-I	01	0	01
Total Credit Hours					**22**
2nd Semester	GEEW	Expository Writing	3	0	3
	GEQR	Quantitative Reasoning-II	3	0	3
	GESS	Social Sciences (Medical Sociology)	2	0	2
	GEIE	Islamic Studies/Ethics	2	0	2
	IDCA-II	Anatomy-II	2	1	3
	IDCP-II	Physiology-II	2	1	3
	MCK-II	Kinesiology-II	3	1	4
	PERL-II	PERL-II	01	0	01
Total Credit Hours					**21**
3rd Semester	GEE	Entrepreneurship	2	0	2
	GECCM	Civics and Community Engagement	2	0	2
	GEICT	Applications of information and communication technologies (ICT)	2	1	3
	IDCA-III	Anatomy -III	2	1	3
	IDCP-III	Physiology-III	2	1	3
	MCBE-I	Biomechanics & Ergonomics- I	2	1	3

	IDCB-I	Biochemistry-I	2	0	2
	EPC-I	English Proficiency-I	02	0	02
	PERL-III	PERL-III	01	0	01
Total Credit Hours					**21**
4th Semester	IDCA-IV	Anatomy-IV	2	1	3
	IDCEP	Exercise Physiology	2	1	3
	MCBE-II	Biomechanics & Ergonomics- II	2	1	3
	MCMP	Medical Physics	2	0	2
	IDCB-II	Biochemistry-II	2	0	2
	PS	Pakistan Studies	2	0	2
	EPC-2	English Proficiency-2	02	0	02
	PERL-IV	PERL-IV	01	0	01
Total Credit Hours					**18**
5th Semester	IDCPM-I	Pathology & Microbiology-I	2	1	3
	IDCPT-I	Pharmacology & Therapeutics-I	2	0	2
	MCTET-I	Therapeutic Exercises & Techniques –I	2	1	3
	MCE-I	Electrotherapy-I	2	1	3
	MCEBP	Evidence-Based practice	3	0	3
	MCSCP-I	Supervised Clinical Practice-I	0	3	3
	EPC-3	English Proficiency-3	02	0	02
	PERL-V	PERL-V	01	0	01
Total Credit Hours					**20**
6th Semester	IDCPM-II	Pathology & Microbiology-II	2	0	2
	IDCPT-II	Pharmacology & Therapeutics-II	2	0	2
	MCTET-II	Therapeutic Exercises & Techniques –II	2	1	3
	MCE-II	Electrotherapy-II	2	1	3
	MCMT-I	Manual Therapy-I	2	1	3
	MCPP	Professional Practice in PT	2	0	2
	MCSCP-II	Supervised Clinical Practice-II	0	3	3

	EPC-4	English Proficiency-4	02	0	02
	PERL-VI	PERL-VI	01	0	01
Total Credit Hours					**21**
7th Semester	IDCS-I	Surgery-I	3	0	3
	IDCM-I	Medicine-I	3	0	3
	MCMPT-I	Musculoskeletal-I (Extremities)	2	1	3
	MCSPT	Sports Physical Therapy	2	1	3
	MCIFE	Internship/Field Experience	3	0	3
	MCSCP-III	Supervised Clinical Practice-III	0	3	3
	EPC-5	English Proficiency-5	02	0	02
	PERL-VII	PERL-VII	01	0	01
Total Credit Hours					**21**
8th Semester	IDCS-II	Surgery-II	3	0	3
	IDCM-II	Medicine-II	3	0	3
	IDCRM	Research Methodology & Scientific Inquiry	2	0	2
	MCMPT-II	Musculoskeletal PT-II (Spine)	2	1	3
	MCMT-II	Manual Therapy-II (Spine)	2	1	3
	MCSCP-IV	Supervised Clinical Practice-IV	0	3	3
	EPC-6	English Proficiency-6	02	0	02
	PERL-VIII	PERL-VIII	01	0	01
Total Credit Hours					**20**
9th Semester	IDCEP	Emergency Procedures & Primary Care in Physical Therapy	2	0	2
	IDCRDI	Radiology & Diagnostic Imaging	2	0	2
	MCNPT-I	Neurological PT-I	2	1	3
	MCCPT	Cardiopulmonary Physical Therapy	2	1	3
	MCIPT	Integumentary Physical Therapy	2	0	2
	MCOGPT	Obstetrics & Gynecological PT	2	0	2
	MCSCP-V	Supervised Clinical Practice-V	0	3	3
Total Credit Hours					**17**

10th Semester	MCNPT-II	Neurological PT-II	2	1	3
	MCCD	Clinical Decision-Making & Differential Diagnosis	3	0	3
	MCPPT	Pediatric Physical Therapy	2	1	3
	MCGGPT	Gerontology & Geriatric PT	2	0	2
	MCOPPT	Orthotics & Prosthetic PT	2	0	2
	MCCP	Capstone Project (3 Cr. Hrs.)	0	3	3
	MCSCP-VI	Supervised Clinical Practice-VI	0	3	3
Total Credit Hours					**19**

ANATOMY- III

Credit Hours: 3(2-1)

30 MCQs & 6 SEQs

5 OSPEs

Learning Outcomes/Objectives:

1. Describe and illustrate human anatomy related to the head, neck, face, skull, abdomen, and pelvis.
2. Identify joints, muscles, nerves, veins, arteries, and other anatomical structures of the head and neck, face, and skull
3. Identify anatomical structures of the abdominal wall, and pelvis through dissection/identification of structures in the manikins / smart board systems supplemented with studying models, prosected materials, and radiographs.
4. Demonstrate the surface markings of clinically important structures, on normal living bodies.

Course Content	MCQs	SEQs	OSPE
The Head and Neck • Muscles around the neck • Triangles of the neck • Main arteries of the neck • Main veins of the neck • Cervical part of sympathetic trunk • Cervical plexus • Cervical spine (vertebrae) • Joints of neck.	**07**	**02**	**01**
The Face • Sensory nerves of the face • Bones of the face • Muscles of the face • Facial nerve • Muscles of mastication • Mandible • Hyoid bone • Temporomandibular joint • Brief description of orbit and nasal cavity • Muscles of eye	**06**	**02**	**01**
The Skull	**07**		**01**

• Bones of skull • Anterior cranial fossa • Middle cranial fossa • Posterior cranial fossa • Base of skull • Structures passing through foramina			
Abdomen and Pelvis			
Abdominal Wall • Structures of anterior abdominal wall: superficial and deep muscles • Structure of rectus sheath • Structures of Posterior abdominal wall • Lumbar spine (vertebrae) • Brief description of viscera	**05**	**01**	**01**
Pelvis • Brief description of anterior, posterior and lateral walls of the pelvis • Inferior pelvic wall or pelvic floor muscles • Sacrum and Bony pelvis • Brief description of perineum • Nerves of perineum	**05**	**01**	**01**
Total	**30**	**06**	**05**

Laboratory Work

During study of Gross Anatomy, emphasis should be given on applied aspect, radiological anatomy, surface anatomy and cross-sectional anatomy of the region covered in the respective semester/year.

Recommended Instructional / Reading Materials:

1. Clinical Anatomy for Medical Students by Richard S. Snell. Latest Ed.
2. Cunningham's Manual of Practical Anatomy by G. J. Romanes,15th Ed., Vol-I, II and III.

ANATOMY-IV

Credit Hours: 3(2-1)

30 MCQs & 6 SEQs

5 OSPEs

Learning Outcomes/Objectives:

1. Describe the regional organization of the human brain & neural pathways
2. Classify the nervous system
3. Explain the structure and function of the spinal cord
4. Describe the concepts of general Embryology.
5. Describe stages of development of axial and appendicular skeleton, muscles, and limbs.

Course Content:	MCQs	SEQs	OSPE
Brain • Central Nervous System: Disposition, Parts and Functions • Brain stem (Pons, Medulla, and Mid Brain) • Cerebrum • Cerebellum • Thalamus • Basal ganglia • Lymbic system • Hypothalamus • Internal Capsule • Blood Supply of Brain • Stroke and its types • Ventricles of Brain • CSF circulation and Hydrocephalus • Meninges of Brain • Neural pathways (Neural Tracts) • Pyramidal and Extra pyramidal System (Ascending and Descending tracts) • Functional significance of Spinal cord level • Cranial Nerves with special emphasis upon IV, V, VII, XI, XII (their course, distribution, and palsies) • Autonomic nervous system, its components • Nerve receptors.	**12**	**3**	**01**

Spinal Cord • Gross appearance • Structure of spinal cord • Grey and white matter (brief description) • Meninges of spinal cord • Blood supply of spinal cord • Autonomic Nervous system	**10**	**2**	**02**
Embryology • Introduction to developing human • Gametogenesis, Spermatogenesis, Oogenesis • Male and female reproductive organs • Fertilization and phases of fertilization • Cleavage, blastocyte formation and implantation of the embryo. • Stages of early embryonic development in second and third week of intrauterine life • Germ layers Derivatives • Fetal membrane (amniotic cavity, yolk sac, allantois, umbilical cord and Placenta) • Developmental defects • Development of limbs, Muscular system and Nervous system	**08**	**1**	**1**
Total	**30**	**06**	**03**

Recommended Instructional / Reading Materials:

1. Clinical Neuroanatomy Anatomy for Medical Students by Richard S. Snell,
2. Langman's Medical Embryology Latest Edition.

PHYSIOLOGY- III

Credit Hours: 3(2-1)

30 MCQs & 6 SEQs

3 OSPEs

Learning Outcomes/Objectives:

By the end of this semester the students will be able to:

1. Explain the physiological aspects of endocrine communication in the human body and describe the functions of hormones secreted by the endocrine glands.
2. Discuss the functions of male and female reproductive systems.
3. Describe the overall organization and functions of human nervous system including sensory, motor, autonomic nervous systems and higher mental functions.
4. Correlate the basic physiological concepts of normal function with diseased conditions.

Course Content	MCQs	SEQs	OSPE
Endocrinology • Classification of endocrine glands • General principles of synthesis, mechanism of action, feedback and control of hormonal secretion • Hormones secreted by the hypothalamus, pituitary gland, thyroid gland, parathyroid gland, adrenal cortex and medulla, and pancreas: synthesis, secretion, mechanism of action and functions • Clinical corelates: Gigantism, acromegaly and dwarfism, hyperthyroidism and hypothyroidism, Addison's disease, Cushing's syndrome and Conn's syndrome, diabetes mellitus and hypoglycemia, rickets, osteoporosis and osteomalacia, hypoparathyroidism and hyperparathyroidism.	**15**	**03**	**01**
Reproduction • Functions of the male reproductive system, Spermatogenesis	**09**	**02**	**01**

• Functions of testosterone in fetal and adult life and its regulation • Functions of the female reproductive system, oogenesis • Functions of estrogen and progesterone and their regulation • Ovarian and menstrual cycles • Physiology of females during pregnancy and lactation, functions of placenta, functions of human chorionic gonadotrophin, parturition, lactation and role of hormones in lactation • Fetal physiology, changes in fetal circulation after birth, respiratory changes after birth • Clinical correlates: hyper and hypogonadism in males and females			
Gastrointestinal Tract • General structure and functions of GIT • Enteric nervous system and electrical properties of GI smooth muscle • Control of gastrointestinal motility and secretions by neural and hormonal mechanisms including enteric hormones • Mastication and swallowing: mechanism and control, functions and secretion of saliva • Function, motility and secretions of stomach, small and large intestine • Mechanism of vomiting and defecation with control pathways • Functions of liver, gallbladder and bile in digestion • Exocrine pancreas and its role in digestion Clinical aspects: Dysphagia, achalasia, gastritis and peptic ulcer, diarrhea and constipation	**06**	**01**	**01**
TOTAL	**30**	**06**	**03**

Laboratory Work

1. Estimation of blood glucose by glucometer
2. Pregnancy test
3. Examination of abdomen related to the GIT

Practical copy will be assessed, and marks will be awarded at the time of examination.

Recommended Instructional / Reading Materials:

1. Textbook of Physiology by Guyton and Hall, 14th ed.
2. Review of Medical Physiology by William F. Ganong, 23rd ed.

PHYSIOLOGY IV

Credit Hours: 3(2-1)

30 MCQs & 6 SEQs

3 OSPEs

Learning Outcomes/Objectives:

By the end of this semester, students will be able to:

1. Describe the normal functioning of the urinary system.
2. Discuss the physiological mechanisms that govern the perception of special senses.
3. Explain the physiology of exercise with reference to changes in hormonal and cardiorespiratory changes.
4. Develop a deep insight regarding the physiology of performance, health and fitness.
5. Explain the regulation of body temperature.
6. Correlate the basic physiological concepts of normal function with diseased conditions.

Course Content:	MCQs	SEQs	OSPE
Body Fluids and Kidney, Acid Base Balance • Regulation of body fluid compartments, ECF, ICF • Structure and functions of the kidney, nephron and its parts • GFR and its regulation • Formation of urine including filtration, re-absorption and secretion • Mechanism of concentration and dilution of urine • Acid base balance • Micturition and its control • Clinical correlates: Edema, dehydration, overhydration, Diabetes insipidus, SIADH, abnormalities of micturition, diuretics, acidosis and alkalosis	**08**	**01**	

Nervous System **Sensory system** • Functional divisions of nervous system • Functions of neurotransmitters and neuropeptides • Types, functions and properties of sensory receptors • Somatic sensations (touch, temperature, pain, pressure etc. along with their ascending tracts) • Analgesia system • Sensory cortex parts and functions **Motor system** • Functions of the spinal cord • Muscle spindle and muscle tone • Reflex action (stretch reflex, Golgi tendon reflex, flexor reflex, crossed extensor reflex) • Functions and divisions of the cerebral cortex • Functions of motor cortex • Motor pathways including pyramidal tract • Basal Ganglia and its functions including Parkinsonism. • Cerebellum and its function including cerebellar lesions and gait abnormalities **HMF** • Physiology of sleep, memory and speech including amnesia and its types, aphasia and its types • Function of the thalamus • Function of the hypothalamus and limbic system • Production of CSF **ANS** Functions of the autonomic nervous system	**05** **04** **04**	**01** **01** **01**	**02**
Special Senses • Physiology of vision: Functional anatomy of eye, optics of vision, accommodation reflex, functions of rods and cones, rhodopsin-retinal visual cycle, color vision • Clinical correlates: errors of refraction, presbyopia	**07**	**01**	**01**

• Physiology of hearing: Physiological anatomy of ear and conduction of sound, physiological basis for determination of frequency, loudness and direction of sound, generation of endochochlear potential • Clinical correlates: deafness and its types. • Physiology of gustation: taste sensations, tongue papillae, nerve supply of tongue, taste blindless, ageusia, dysgeusia • Physiology of olfaction: Olfactory membrane, sensations of smell, anosmia, parosmia, hyperosmia			
Body Temperature regulation • Normal body temperature • Heat production and loss • Sweat glands and sweat production • Regulation of sweating by autonomic nervous system • Role of hypothalamus in regulation of body temperature • Behavioral control of body temperature • Clinical correlates: fever, heatstroke, frost bite and artificial hypothermia	**02**	**01**	
Total	**30**	**06**	**03**

Laboratory Work

Nervous system:

1. Examination of sensory system
2. Examination of the motor system
3. Examination of superficial reflexes
4. Examination of deep tendon reflexes
5. Examination of the cranial nerves
6. Examination of cerebellar function
7. Recording of normal body temperature

Special senses:

1. Determination of visual acuity (near and far)
2. Examination of color vision

3. Examination of visual reflexes
4. Examination of hearing
5. Examination of the sense of taste
6. Examination of the sense of olfaction

Practical copy will be assessed, and marks will be awarded at the time of examination.

Recommended Instructional / Reading Materials:

1. Textbook of medical physiology Guyton and Hall, 14th ed.
2. Review of Medical Physiology by William F. Ganong, 23rd ed.

BIOMECHANICS & ERGONOMICS-I

Credit Hours: 3(3-0)

30 MCQs & 6 SEQs

3 OSPEs

Learning Outcomes/Objectives:

1. Define concepts and terminology within the area of biomechanics
2. Describe statics, kinematics and kinetics in human movement
3. Analyze and describe the motion of a body or system using qualitative and quantitative approach.
4. Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues of the musculoskeletal system during movement
5. Apply knowledge of the underlying musculoskeletal principles and concepts of
6.
7. nics including the core areas of human movements in upper and lower extremity.
8. Understand and apply knowledge, tools and techniques used in Ergonomics.

Course Content	MCQs	SEQs	OSPEs
BIOMECHANICS			
Basic Terminology ▪ Biomechanics ▪ Mechanics ▪ Dynamics ▪ Statics ▪ Kinematics ▪ Kinetics and anthropometries ▪ Scope of scientific inquiry addressed by biomechanics ▪ Difference between quantitative and qualitative approach for analyzing human.	**01**	**00**	
Kinematic Concepts for Analyzing Human Motion • Common units of measurement for mass, force, weight, pressure, volume, density, specific weight, torque and impulse. • Different types of mechanical loads that act on human body	**02**	**01**	

• Uses of available instrumentation for measuring kinetic quantities			
Biomechanics of Tissues and Structures of the Musculoskeletal System • Biomechanics of Bone • Biomechanics of Articular Cartilage • Biomechanics of Tendons and Ligaments • Biomechanics of Peripheral Nerves and Spinal Nerve Roots • Biomechanics of Skeletal Muscles	**03**	**00**	
Biomechanics of the Human Upper Extremity • Biomechanics of the Shoulder • Biomechanics of the Elbow • Biomechanics of the Wrist and Hand • Factors that influence relative mobility and stability of upper extremity articulation • Muscles that are active during specific upper extremity movements • Biomechanical contributions to common injuries of the upper extremity.	**07**	**01**	**01**
Biomechanics of Human Lower Extremity • Biomechanics of the Hip • Biomechanics of the Knee • Biomechanics of the ankle and foot • Factors influencing relative mobility and stability of lower extremity articulations • Adaptation of lower extremity to its weight bearing functions • Muscles that are active in specific lower extremity movements • Biomechanical contribution to common injuries of the lower extremity.	**07**	**02**	**01**
ERGONOMICS			
Overview and Conceptual Frame work • Ergonomics and Therapy: An Introduction • A Client-Centered Framework for Therapists in Ergonomics • Macroergonomics	**04**	**01**	
Knowledge, Tools, and Techniques • Ergonomic Assessments/Work Assessments	**02**		

• Anthropometry. • Cognitive and Behavioral Occupational Demands of Work • Psychosocial Factors in Work-Related Musculoskeletal Disorders			
• Physical Environment. • Human Factors in Medical Rehabilitation Equipment: Product Development and Usability Testing.	**04**	**01**	
GONIOMETRY			
Laboratory Work • Introduction to Goniometry • Basic concepts in Goniometry • Procedures • Positioning • Stabilization • Measurements Instruments • Alignment • Recording • Procedures • Measurement of upper extremity • Measurement of temporomandibular, cervical, thoracic & lumber spine			**01**
Total	**30**	**06**	**03**

Recommended Instructional / Reading Materials:

Text Books:

1. Basic Biomechanics, By: Susan J. Hall 4th edition.
2. Basic biomechanics of Musculoskeletal system by Nordin & Frankel 3rd Edition.
3. Ergonomics for the therapist by Karen Jacobs 3rd edition mosby and Elsevier publishers

Reference Books:

1. Measurement of joint motion a guide to goniometry by Cynthia C.Norkin

BIOMECHANICS & ERGONOMICS- II

Credit Hours: 3(2-1)

30 MCQs & 6 SEQs, 3 OSPEs

Learning Outcomes/Objectives:

1. Describe biomechanical structure and function of human connective, muscular, nervous and skeletal tissues.
2. Explain mechanical, neural and muscular events in normal and pathological motion
3. Explain mechanical and ergonomic principles are applied in understanding the human movement.
4. Discuss basic concepts, principles and theories of Ergonomics.

Course Content	MCQs	SEQs	OSPEs
Biomechanics of Human Spine • Biomechanics of the Lumbar Spine • Biomechanics of the Cervical Spine • Factors influencing relative mobility and stability of different regions of Spine • Biomechanical adaptations of spine during different functions • Relationship between muscle location, nature and effectiveness of muscle action in the trunk • Biomechanical contribution to common injuries of the spine.	**6**	**2**	**01**
Applied Biomechanics • Introduction to the Biomechanics of Fracture Fixation • Biomechanics of Arthroplasty • Engineering Approaches to Standing, Sitting, and Lying • Biomechanics of Gait	**5**	**1**	
Angular Kinetics of Human Movement • Angular analogues of mass, force, momentum and impulse • Angular analogues of Newton's laws of motion • Centripetal and Centrifugal forces • Angular acceleration	**3**	**0**	

Angular Kinematics of Human Movement • Measuring body angles • Angular kinematics Relationships • Relationship between Linear and Angular motion	**3**	**1**	**0.5**
Human Movement in Fluid Medium • The nature of fluids • Buoyancy and floatation of human body • Drag and components of drag Lift Force • Propulsion in a fluid medium	**3**	**0**	
ERGONOMICS II **Special Considerations** • Lifting Analysis • Seating • Computers and Assistive Technology	**5**	**1**	**0.5**
Ergonomics of Aging	**2**	**1**	
Application Process • Ergonomics of Children and Youth. • Ergonomics in Injury Prevention and Disability Management • Ergonomics of Play and Leisure	**3**		
GONIOMETRY			
Laboratory Work • Introduction to Goniometry • Basic concepts in Goniometry • Procedures • Positioning • Stabilization • Measurements Instruments • Alignment • Recording • Procedures • Measurement of lower extremity			**0.5**
• Biomechanical assessment of Gait			**0.5**
TOTAL	**30**	**6**	**03**

Recommended Instructional / Reading Materials:

Text Books:

1. Basic Biomechanics, By: Susan J. Hall 4th edition.
2. Ergonomics for the therapist by Karen Jacobs 3rd edition Mosby and Elsevier publishers

Reference Books:

1. Measurement of joint motion a guide to goniometry by Cynthia C.Norkin

BIOCHEMISTRY-I

Credit Hours: 2(2-0)

30 MCQs & 6 SEQs

Learning Outcomes/Objectives:

1. Explain biochemical description of different human tissues
2. Describe respiration at cellular and molecular level
3. Explain metabolism of carbohydrates, protein and lipids

Course Content	MCQs	SEQs
Cell • Introduction to Biochemistry • Cell: (Biochemical Aspects) • Cell Membrane Structure • Membrane Proteins • Receptors & Signal Molecules	**02**	**0**
Body Fluids • Structure and properties of Water • Weak Acids & Bases • Concept of pH & pK • Buffers, their mechanism of action. • Body buffers	**02**	**0**
Biomolecules: Amino Acids, Peptides & Proteins ▪ Amino acids: Classification ▪ Acid-Base Properties ▪ Functions & Significance ▪ Protein Structure, Primary, Secondary & Super secondary. &, Structural Motifs ▪ Tertiary & Quaternary Structures of Proteins ▪ Protein Domains ▪ Classification of Proteins ▪ Fibrous proteins (collagens and elastins) & Globular proteins	**04**	**0**
Enzymes • Introduction • Classification & Properties of Enzymes • Coenzymes • Isozymes & Proenzymes	**04**	**01**

• Regulation & Inhibition of Enzyme activity & enzymes inhibitors • Clinical Diagnostic Enzymology.		
Carbohydrates • Definition • Classification • Biochemical Functions & Significance of Carbohydrates • Structure & Properties of Monosaccharides& Oligosaccharides • Structure & Properties of Polysaccharides • Bacterial cell Wall • Heteropolysaccharides • GAGS	**04**	**01**
Lipids • Classification of Lipids • Fatty Acids: Chemistry • Classification occurrence & Functions • Structure & Properties of Triacylglycerols and Complex Lipids • Classification & Functions of Eicosanoids • Cholesterol: Chemistry, Functions & Clinical Significance • Bile acids/salts.	**04**	**01**
Nucleic Acids • Structure, Functions & Biochemical Role of Nucleotides • Structure & Functions of DNA • Structure & Functions of RNA	**04**	**01**
Nutritional Biochemistry Minerals & Trace Elements ▪ Sources ▪ RDA ▪ Biochemical Functions & Clinical Significance of Calcium & PhosphorusSources ▪ RDA ▪ Biochemical Functions & Clinical Significance of Sodium Potassium& Chloride ▪ Metabolism of Iron, Cu, Zn, Mg, Mn, Se, I, F.	**04**	**0**
Vitamins • Sources	**02**	**01**

• RDA • Biochemical Functions & Clinical Significance of Fat-Soluble Vitamins Sources • RDA • Biochemical Functions & Clinical Significance of Water-Soluble Vitamins.		
Nutrition • Dietary Importance of Carbohydrates, Lipids & Proteins • Balanced Diet.	**0**	**01**
Total	**30**	**06**

Recommended Instructional / Reading Materials:

1. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey, Latest Ed.
2. Textbook of Medical Biochemistry Vol-I and II by M.A. Hashmi.

BIOCHEMISTRY-II

Credit Hours: 2(2-0)

30 MCQs & 6 SEQs

Learning Outcomes/Objectives:

1. Explain biochemical description of different human tissues
2. Describe respiration at cellular and molecular level
3. Explain metabolism of carbohydrates, proteins and lipids

Course Content	MCQs	SEQs
Tissue Biochemistry • Extracellular matrix • Collagen • Elastin and Extracellular Matrix Components • Biochemistry of Proteoglycans • Bone & Teeth • Muscle & Cytoskeleton	**4**	**1**
Metabolism **Bioenergetics** • Introduction to Bioenergetics • Biological Oxidations • Electron Transport Chain and Oxidative Phosphorylation	**5**	**1**
Metabolism of Carbohydrates • Digestion & Absorption of Carbohydrates • Glycolysis & its regulation • Citric Acid Cycle • Metabolism of Glycogen • Gluconeogenesis and regulation of blood glucose • Pentose Phosphate Pathway & its Significance	**8**	**1**
Metabolism of Lipids • Digestion & Absorption of Lipids • Metabolism & Clinical Significance of Lipoproteins • Fatty acid oxidation biosynthesis and metabolism of triglycerides • Metabolism & clinical Significance of Cholesterol • Metabolism of Eicosanoids	**7**	**2**

Metabolism Of Proteins & Amino Acids • Digestion of Proteins & Absorption of Amino Acids • Transamination & Deamination of Amino Acids and urea cycle • Specialized products for med from Amino Acids	**6**	**1**
Total	**30**	**06**

Recommended Instructional / Reading Materials:

1. Lippincott's Illustrated Review of Biochemistry by Pamela C. Champe and Richard A. Harvey, Latest Edition.
2. Textbook of Medical Biochemistry Vol-I and II by M. A. Hashmi.

MEDICAL PHYSICS

Credit Hours: 2(2-0)

30 MCQs & 6 SEQs

Learning Outcomes/Objectives:

1. Describe basic principles of physics used in electro medical equipment
2. Define laws of physics various aspect of physical phenomena and their interaction with human body
3. Describe basic concepts of electricity, its laws, magnetism, electro mechanics and related theories
4. Explain fundamentals of low, medium and high frequency currents, heat, electromagnetic radiations and sound waves.
5. Demonstrate safety skills in biomedical instruments and radiation Protection

Course Content	MCQs	SEQs
Electricity and Magnetism • Structure of an atom • Electron Theory, Conductors & Insulators • Conduction& Convection	**02**	**00**
Static Electricity • Charging by conduction and Induction • Electrostatic Fields • Capacitors, types of capacitors • Arrangement of Capacitors in series and parallel • Charging and discharging of capacitors • Oscillating Discharge of Capacitors	**05**	**01**
Current Electricity • Ohm‘s Law • Electrical Components and their units • Resistance and types • Chemical effects of a Current • Types of Current • Cell and Batteries • Simple Voltage Cell • Combination of Cells in series and parallel • Thermal effects of current • Electrolysis and Electrolytic burns	**03**	**01**
Electromagnetism	**03**	**01**

• Magnetic effect of an electric current • Moving coil volt meter and Ammeter • Measurement of high frequency and alternate current with meters • Electromagnetic induction • Faradays law • Mutual and self-Induction • Eddy currents • Transformers • Construction and types • Static and auto Transformer		
Sound Waves • Wave motion in sound • Infrasonic • Normal hearing band • Characteristics of the sound waves and their velocities • Ultrasonic • Reflection and refraction of sound waves • Characteristics of tone resonance and beats • Interference of sound waves	**04**	**01**
Heat • Scales of temperature and its conversion to other scales • Nature of heat energy • Specific heat and three modes of heat energy transfer effect of impurities on melting and boiling points	**02**	**00**
Electromagnetic Radiation • Electromagnetic spectrum • Relationship between frequency and wave length • Laws of reflection, refraction and absorptions • Total internal reflection • Cosine law and inverse square law • Concave and convex mirrors • Lenses and prisms • Reflectors • Radio wave (long, medium, short, micro waves) • Infra-red rays • Visible rays • Ultra violet rays • X-rays	**05**	**01**

• Nuclear waves (alpha beta and gamma		
Safety in Biomedical Instruments • Electrical outlets, hot, neutral and ground connections • Pervasiveness of electricity and of electric shocks • Causes of electric shocks and precaution • Effect of electric current on human body • Techniques to reduce the effect of electric shock • Earth shocks and precaution against earth shocks	**03**	**01**
Radiation Protection • Ionizing and non-ionizing radiations • Quantities and associated units of radiations • Effect of ionizing and non-ionizing radiation • Internal and external hazards • Main principle to control external hazard • Distance and shielding	**03**	**00**
Total	**30**	**6**

Recommended Instructional / Reading Materials:

Text book:

1. Clayton's Electrotherapy and Actinotherapy by: P. M Scott.8th Edition

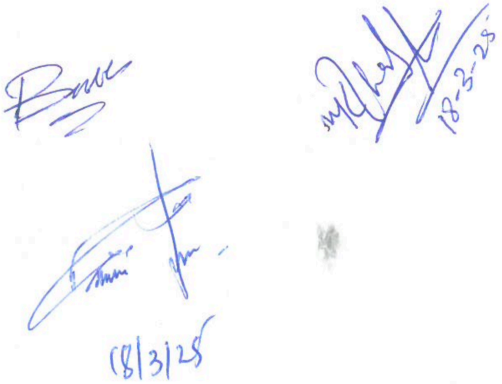
Reference Book:

1. Medical physics for physical therapists by: A. D Moore.

Allied Health Sciences

Curricula 2024

BS. OCCUPATIONAL THERAPY CURRICULUM



SCHEME OF STUDIES

Semester	Course Code	Course Title	Credit Hours		
			Theory	Practical	Total
1st Semester	GEFE	Functional English	03	00	03
	GEQR	Quantitative Reasoning-I	03	00	03
	GENS	Natural Sciences	02	01	03
	GEAH	Arts and Humanities	02	00	02
	GEICP	Ideology and Constitution of Pakistan	02	00	02
	IDC	Basic Biochemistry	03	00	03
	PERL-I	PERL-I	01	00	01
	GEFE	Functional English	03	00	03
Total			**20**		
2nd Semester	GEEW	Expository Writing	03	00	03
	GEQR	Quantitative Reasoning-II	03	00	03
	GESS	Social Sciences	02	00	02
	GEIE	Islamic Studies/Ethics	02	00	02
	BAN	Basic Anatomy	03	00	03
	BPH	Basic Physiology	03	00	03
	BOT 107	Fundamentals of Occupational Therapy	02	00	02
	PERL-II	PERL-II	01	00	01
TOTAL			**19**		
3rd Semester	GECCM	Civics and Community Engagement	02	00	02
	GEICT	Fundamentals of ICT (Computer Sciences)	02	01	03
	GPA	General Pathology	03	00	03
	BOT 115	Neuroanatomy	03	00	03
	BOT 116	Neurophysiology	03	00	03
	BOT 117	Entrepreneurship	02	00	02
	BOT-150	Supervised Clinical Rotation-I	00	01	01
	BOT 122	Kinesiology & Biomechanics-I (Goniometry / Manual Muscle Testing)	02	00	02
	EPC-1	English Proficiency-1	02	00	02
	PERL-III	PERL-III	01	00	01
TOTAL			**22**		
4th Semester	BOT 119	Community Based Medicine Rehabilitation & Occupational Health	02	00	02
	BOT 120	Embryology, Pediatrics, Developmental Paediatrics	04	00	04
	BOT 121	Occupational Therapy in Developmental Paediatrics	02	01	03
	BOT 149	Kinesiology & Biomechanics-II (Goniometry / Manual Muscle Testing)	02	02	04
	BOT 123	Activities of Daily Livings	02	01	03

	BOT 124	Supervised Clinical Rotation II	00	01	01
	PS	Pakistan Studies	02	00	02
	EPC-2	English Proficiency-2	02	00	02
	PERL-IV	PERL-IV	01	00	01
	Total		**22**		
5th Semester	BOT 125	Medicine-I	03	00	03
	BOT 126	Surgery–I	03	00	03
	BOT 127	Occupational Therapy in Orthopedics and Surgical Conditions	02	01	03
	BOT 128	Occupational Therapeutics	02	01	03
	BOT 151	Basic Pharmacology	02	00	02
	BOT 130	Supervised Clinical Rotation III	00	02	02
	EPC-3	English Proficiency-3	02	00	02
	PERL-V	PERL-V	01	00	01
	Total		**19**		
6th Semester	BOT 131	Medicine-II	03	00	03
	BOT 132	Surgery–II	03	00	03
	BOT 133	Occupational Therapy in Cardiac and Pulmonary Diseases	02	01	03
	BOT 134	Occupational Therapy in Critical Care, Visual and Hearing Impaired, Burns & Oncology	02	01	03
	BOT 135	First Aid, CPR & Crisis Intervention Management	01	01	02
	BOT 136	Professional Ethics	02	00	02
	BOT 152	Supervised Clinical Rotation-IV (Cardiopulmonary, Burns, Oncology, ICU, Geriatrics)	00	02	02
	EPC-4	English Proficiency-4	02	00	02
	PERL-VI	PERL-VI	01	00	01
	TOTAL		**21**		
7th Semester	BOT 137	Hand Rehabilitation & Splinting	01	01	02
	BOT 153	Psychology	03	00	03
	BOT 138	Psychiatry	03	00	03
	BOT 139	Occupational Therapy in Mental Health	03	01	04
	BOT 140	Ergonomics & Vocational Rehabilitation	03	01	04
	BOT 142	Supervised Clinical Practice-V (Field Work)	00	03	03
	EPC-5	English Proficiency-5	02	00	02
	PERL-VII	PERL-VII	01	00	01
	TOTAL		**22**		
8th Semester	BOT 143	OT Values, Beliefs in Action & Evidence Based OT Practice	02	00	02
	BOT 144	Research Project (Capstone Project)	00	03	03
	BOT 145	Organization, Administration & Work Study in Occupational Therapy	02	00	02

	BOT 146	Sensory Integration Therapy	02	01	03
	BOT 147	Therapeutic Activities & Exercises	02	01	03
	BOT 129	Orthotics, Prosthetics& Assistive Technologies	02	01	03
	BOT 148	Supervised Clinical Practice VI	00	02	02
	EPC-6	English Proficiency-6	02	00	02
	PERL-VIII	PERL-VIII	01	00	01
	TOTAL		**21**		

NEUROPHYSIOLOGY
03 CREDIT HOURS
(45 MCQs + 09 SEQs)

Learning Outcomes/Objectives:

The students will able to:

1. Describe the physiological aspects that govern the functions of the nervous system, special senses and higher mental functions.

Course Content:	MCQs	SEQs
Physiology of Nervous System Functions of neurons, nerves, receptors, neurotransmitters, synapses, spinal cord, sensory and motor cortex, basal ganglia, cerebellum, thalamus and hypothalamus.	**12**	**2**
Physiology of vision Optics of vision, accommodation reflex, pupillary diameter, errors of refraction, visual acuity, intraocular pressure, retina, visual pathway and its lesions, photochemistry of vision and visual cycle, colour vision and its abnormalities	**8**	**2**
Physiology of hearing Impedance matching, attenuation reflex, cochlea, endochochlear potential, determination of loudness, frequency and direction of sound, hearing pathway, types of deafness	**5**	**1**
Physiology of olfaction Olfactory membrane, olfactory sensations, pathway	**4**	**1**
Physiology of gustation Taste sensations, taste buds and receptors, taste mapping, taste pathway, taste blindness	**4**	**1**
Physiology of balance and equilibrium Vestibular apparatus, macula, kinocilia, utricle and saccule	**4**	**1**
Physiology of higher mental functions Physiological basis of speech, Wernicke's and Broca's areas, aphasia and its types, Types and mechanisms of memory, dementia and memory loss, Physiology of sleep, types of sleep	**8**	**1**
TOTAL	**45**	**09**

Recommended Instructional / Reading Materials:

1. Guyton and Hall Text book of Physiology 14th ed
2. Ross and Wilson Anatomy and Physiology in Health and Illness, 13th ed.

NEUROANATOMY
03 CREDIT HOURS
(45 MCQs + 09 SEQs)

Learning Outcomes/Objectives:

The students will able to:

1. Describe the anatomical structure and organization of the nervous system and special senses, with an emphasis on their functional relevance in occupational therapy
2. Apply neuroanatomical knowledge to clinical cases commonly encountered in occupational therapy practice.

Course Content:	MCQs	SEQs
Overview of Nervous System & CNS Organization Basic organization of Nervous system Parts of CNS Development of Nervous system; Neural tube and Brain vesicles Classification and structure of neurons & neuroglia Meninges, Ventricles and CSF circulation Clinical application: Hydrocephalus, Epidural anesthesia	**5**	**1**
Overview of the Peripheral Nervous System Motor nerve endings. Sensory nerve endings/ Receptors Origin, exit from vertebral canal, branches & Distribution of typical spinal nerve. Division of Autonomic Nervous System into Sympathetic and parasympathetic, Comparison of anatomical differences. Clinical application: Guillain Barre Syndrome, Wallerian Degeneration, Nerve Regeneration	**5**	**1**
Anatomy of Spinal Cord Location, Extent, Coverings and Blood supply of spinal cord. External features and Internal structure of spinal cord Transverse section of spinal cord at mid cervical level showing nuclear organization and tracts. First, second, third order neurons of Ascending and Descending tract Pyramidal and Extra pyramidal System Clinical application: Spinal cord Injuries, Brown-Sequard syndrome, Upper and Lower Motor Neuron Lesions, ALS	**10**	**2**
Overview and Organization of the Brainstem Location, Relations, Blood supply and external features of medulla, pons midbrain. Cross sectional details of white and grey matter of Brain stem (mid brain, pons, medulla)	**4**	**1**
Cerebrum Lobes, Sulci & Gyri, Functional areas of each lobe Emphasis on Speech areas Blood supply of Cerebrum Clinical application: Stroke, Aphasia	**4**	**1**
Subcortical Areas for Motor control, Sensory integration and Memory	**5**	**1**

Cerebellum structure and connection, Thalamus & Hypothalamus Nuclei and connections, Basal Ganglia and Limbic system. Clinical application: Ataxia, Parkinson's Disease, Dementia.		
Introduction to Cranial Nerves Origin, Course, distribution of Cranial Nerves; Emphasis on V, VII, IX and X Sensory and Motor innervation of Head and Neck Clinical application: Bell's Palsy, Dysphagia, Trigeminal Neuralgia	**6**	**1**
Special Senses (Vision, Hearing, Taste, Smell, Balance) Structure of Retina, visual pathway Hearing pathway Taste buds and Taste Pathways Olfactory pathway and Vestibular pathway Clinical application: Lesions of these pathways.	**6**	**1**
TOTAL	**45**	**09**

Recommended Instructional / Reading Materials:

1. Clinical Neuroanatomy by Richard S. Snell, Latest Edition
2. Ross and Wilson Anatomy and Physiology in Health and Illness, 13th ed.

KINESIOLOGY & BIOMECHANICS -I

(GONIOMETRY / MANUAL MUSCLE TESTING)

Credit Hours 02(2+0)

Learning Outcomes/Objectives:

1. Define the mechanical principles and their application on the human body
2. Describe concept of movement and how it occurs in body
3. Demonstrate fundament position, their effects and uses
4. Explore fundamental skills to differentiate between a good and bad posture and to use technique for re-education
5. Develop critical thinking ability in students on how and why to select which technique in a specific case, suitable for its rehabilitation
6. Describe muscular anatomy, its function against gravity and manual resistance

Course Content	MCQs	SEQs
I. Introduction To Kinesiology i. Definition of Physical Therapy and Rehabilitation ii. Definition of Kinesiology iii. Mechanical Principles and Mechanics of Position iv. Force - force system – Description of units v. Gravity: Center of gravity and line of gravity vi. Level of gravity vii. Equilibrium 28 viii. Fixation and Stabilization ix. Mechanics of movement x. Axes / Planes xi. Speed xii. Velocity xiii. Acceleration xiv. Momentum xv. Inertia xvi. Friction xvii. Lever - types – application in human body xviii. Pulley - types – application in human body xix. Angle of pull	**3**	**1**
II. **Introduction to Movement** i. Types of movement and posture ii. Patterns of movement iii. Timing in movement iv. Rhythm of movement v. The nervous control of movement	**2**	**0**
III. An Introduction to Exercise Therapy i. Define Exercise Therapy ii. Explain the aims of exercise therapy iii. Define and classify the exercise therapy in context with movement and posture.	**3**	**1**

iv. Explain briefly approach and assessment to patient's problem		
IV. Starting Positions i. Definition ii. Fundamental positions iii. Standing iv. Kneeling v. Sitting vi. Lying vii. Hanging viii. The pelvic tilt	**3**	**1**
V. Derived Positions i. Purpose of Derived Positions ii. Positions derived from standing by: alteration of arms, legs and trunk. iii. Positions derived from kneeling iv. Positions derived from sitting by: alteration of the legs & by alteration of trunk v. Positions derived from lying, by alteration of arms and by alteration of the legs vi. Positions derived from hanging vii. Other positions in which some of the weight is taken on the arms	**3**	**0**
VI. Posture i. Inactive postures ii. Active postures iii. The postural mechanism iv. The pattern of posture v. Principles of Re- Education vi. Techniques of Re-Education vii. Prevention of muscles wasting viii. The initiation of muscular contraction ix. Abnormal postures	**4**	**1**
VII. Muscle Strength and Muscle Action i. Types of Muscles contraction ii. Muscles tone iii. Physiological application to postural tone iv. Group action of muscles v. Overview of muscle structure vi. Types of muscle work vii. Range of muscle work viii. Two joint muscle work ix. Active and passive insufficiency x. Group movement of joints xi. Muscular weakness and paralysis	**4**	**2**
VIII. Techniques Of Strengthening Muscles i. Overview of techniques of strengthening muscles by assisted, resisted and free exercises of all joints	**4**	**0**

ii. Muscles of Lower Limb iii. Muscles of Upper Limb iv. Muscles of Spine		
IX. Introduction to Goniometry	02	0
X. Biomechanical Principles	02	0
Total	**30**	**6**

Recommended Instructional / Reading Materials:

Text Books:

1. The principles of exercise therapy by: M. Dena Gardiner, 4th Edition.

Reference Books:

1. Practical exercise therapy by Margaret Hollis 3rd Ed. illustrated, reprint, Blackwell Scientific
2. Muscle function testing by: Cunningham and Daniel. 2nd, illustrated

Kinesiology & Biomechanics -II
(Goniometry / Manual Muscle Testing)
Credit Hours 04(2+2)

Teaching Objectives:

- Understand the basic principles of kinesiology and biomechanics as they relate to human movement and rehabilitation.
- Learn to measure joint range of motion (ROM) using goniometry.
- Learn manual muscle testing techniques to evaluate muscle strength and function.
- Develop the ability to identify musculoskeletal issues and develop appropriate interventions.

Observation:

- Observe a therapist performing joint range of motion measurements and manual muscle testing in a clinical setting.
- Shadow a therapist conducting functional movement assessments, paying attention to postural alignment and movement patterns.
- Participate in group exercises where you observe and practice goniometry and manual muscle testing.

Skills Evaluation:

- Perform joint range of motion (ROM) measurements using a goniometer on a patient.
- Conduct manual muscle testing on a patient, evaluating muscle strength and identifying weak muscle groups.
- Analyze a client's posture and movement to identify any biomechanical dysfunction.
- Develop a treatment plan based on the biomechanical assessment, focusing on improving range of motion or muscle strength.

Course Content	MCQs	SEQs	OSPEs
TYPES OF MOVEMENT & EXERCISES			
I. **Active Movement:** i. Voluntary & involuntary movements ii. Active and Passive movements iii. Classification & techniques of free exercises iv. The principles, techniques and effects of assisted exercises v. The principles, techniques and effects of assisted resisted exercises vi. The principles, types, techniques and effects of resisted exercises vii. Variation of the power of the muscles in different parts of their range viii. Progressive Resistance Exercise ix. Reflex movement x. The reflex arc xi. The stretch reflex xii. The righting reflexes xiii. The postural reflexes **xiv.** Effects and uses of reflex movement	**4**	**1**	

II. **Passive Movement** i. The principles, types, techniques and effects of passive exercises ii. Definition of Passive manual mobilization and manipulations iii. Controlled sustained stretching, Principles and Effects and uses	**2**	**1**	0.5
III. **Joint Mobility** i. Explain joint mobility, structural features of joint and classification of joints	**3**	**1**	
ii. Explain the causes and factors of limitation of joint range of movement iii. Explain the prevention of joint stiffness iv. Recall the mobilizing methods and active method			
IV. Techniques of Mobilizing Joints i. Overview of relaxed passive movement, assisted movements and free exercises of all joints ii. Joints of the Lower Limb iii. Joints of the Upper Limb iv. Joints of the Vertebral Column	**3**		**01**
V. **Relaxation** i. Definition ii. Muscle tone iii. Postural tone iv. Voluntary movement v. Mental attitudes vi. Degrees of relaxation vii. Pathological tension in the muscles viii. Technique ix. General relaxation x. Local relaxation	**3**	**1**	
VI. **Suspension Therapy** i. Suspension application ii. Suspension concept of inclined planes iii. The fixed-point suspension iv. Supporting rope and its types v. Sling and its types vi. Type of suspension: axial &vertical vii. Methods, techniques of suspension: upper limb & lower limb viii. Suspension effect on muscle work and joint mobility	**04**		0.5
VII. **Neuromuscular Co-Ordination** i. Coordinated movement ii. Group action of muscles iii. Nervous control iv. Incoordination v. Re-Education vi. Frenkel's exercises.	**03**	**1**	**01**

VIII. **Proprioceptive Neuromuscular Facilitation** i. Introduction to neuromuscular facilitation ii. Proprioceptive neuromuscular facilitation: define, explain and apply basic techniques of PNF and also techniques of emphasis of PNF which includes: Repeated contractions, slow reversals, rhythmic stabilizations, hold-relax, rhythmic initiation.	06	01	
IX. **Walking Aids** i. Crutches ii. Sticks iii. Tripod or Quadra pod iv. Frames	**5**		**01**
MANUAL MUSCLE TESTING			
X. Manual Muscle Testing **Laboratory Work** i. Manual muscle testing - Regional Upper limb muscle testing ii. Manual muscle testing - Regional Lower limb muscle testing iii. Manual Muscle testing-Spine		**1**	**02**
Total	**30**	**06**	**06**

Recommended Instructional / Reading Materials:

1. The principles of exercise therapy by: M. Dena Gardiner, 4th Edition.
2. Muscle function testing by: Cunningham and Daniel. 2nd, illustrated
3. Practical exercise therapy by M.Hollis (for suspension therapy)

Occupational Therapy In Developmental Pediatrics

Credit Hrs. 3 (2+1)

Teaching Objectives:

- Apply knowledge of developmental pediatrics, general pediatrics, and embryology to provide therapeutic interventions.
- Understand how prenatal development influences postnatal health and development.
- Develop an understanding of how pediatric conditions, such as cerebral palsy and spina bifida, impact occupational therapy interventions.

Observation:

- Observe a pediatric occupational therapy session, focusing on children with disabilities like cerebral palsy or sensory processing disorders.
- Attend prenatal and pediatric developmental counseling sessions to learn how therapists work with families.
- Visit a pediatric hospital or clinic to observe the multidisciplinary approach to treating developmental conditions.

Skills Evaluation:

- Develop and implement therapeutic interventions for children with physical disabilities or developmental delays.
- Write an assessment report detailing the occupational therapy needs of a pediatric patient.
- Demonstrate the ability to create family-centered therapy plans for children in pediatric and developmental contexts.

Course Content		MCQs	SEQs	OSPE
Foundations of pediatric practice	Occupational Therapy Practice Framework in Pediatric Practice	2	2	1
	Using Evidence to Guide Occupational Therapy Practice in pediatrics	3		
	Structure of the Frame of Reference in pediatric practice	3		
	Development Perspective:	2		
	Domain of Concern of Occupational Therapy: Relevance to Pediatric Practice	1		
	Contemporary Legitimate Tools of Pediatric Occupational Therapy	1		
	The Perspective of Context as Related to Frame of Reference	2		
Frame of reference of occupational therapy	The Developmental Treatment Approach.	4	1	1
	The Analysis of Four Theoretical Frameworks for Occupational Therapy.			
	The Seven Adaptive Skills.			
Diagnosis ad intervention of	Acquired Brain Injury, Epilepsy (Seizure Disorder) Hydrocephalus	3	2	1

most common pediatric diseases	Attention De cit/Hyperactivity Disorder, Autism Spectrum Disorders, Learning Disabilities, Cerebral Palsy, Cri du Chat Syndrome, Down Syndrome (Trisomy 21), Developmental Coordination Disorder	4		
School based occupational therapy treatment for special conditions		5	1	

RECOMMENDED BOOKS*:*

1. *Pediatric occupational therapy handbook a guide to diagnoses and evidence-based interventions, Patricia bowyer • Susan m. Cahill*
2. *Frames of reference for pediatric occupational therapy, 3rd edition,*
3. *Paula Kramer, Jim Hinojosa*,
4. *Willard& spackman's Occupational Therapy, Elizabeth Blesedell Crepeau, Ellen S. Cohn, Barbara A. Boyt Schell, 11th edition*

Supervised Clinical Rotation-I

1. Introduction and Orientation

- **Purpose & Goals**: Clear understanding of clinical rotation objectives.
- **Clinical Setting**: Familiarization with the setting (hospital, clinic, rehab).
- **Health & Safety**: Infection control, emergency procedures, client privacy.
- **Roles & Responsibilities**: Student's role and participation expectations.

2. Supervised Patient Care

- **Client Assessment**: Conducting basic assessments under supervision.
- **Treatment Planning**: Collaborating on goal-setting and intervention planning.
- **Interventions**: Assisting with therapeutic activities and adaptive equipment.
- **Documentation**: Learning patient progress documentation.

3. Skill Development

- **Therapeutic Techniques**: Practicing motor coordination, cognitive interventions, ADL training.
- **Activity Analysis**: Breaking down tasks for client abilities.
- **Adaptation**: Modifying environments or tasks for independence.
- **Assistive Technology**: Introduction to adaptive tools and devices.

4. Supervision and Feedback

- **Regular Supervision**: Ongoing feedback and progress discussions.
- **Reflective Practice**: Self-reflection on clinical experience.
- **Formative Assessments**: Evaluations to assess clinical competence.

5. Collaboration with the Interdisciplinary Team

- **Communication Skills**: Effective communication with healthcare professionals.
- **Case Discussions**: Participating in interdisciplinary team meetings.

6. Cultural Sensitivity & Client-Centered Care

- **Client-Centered Practice**: Tailoring interventions to client needs and preferences.
- **Cultural Competence**: Respecting cultural influences in treatment approaches.

7. Professionalism and Ethical Practice

- **Ethical Considerations**: Confidentiality, informed consent, and boundaries.
- **Time Management**: Balancing workload efficiently.
- **Professional Behavior**: Demonstrating integrity and responsibility.

8. Final Evaluation and Reflection

- **End-of-Rotation Evaluation**: Assessment of student’s performance.
- **Self-Reflection**: Identifying growth and areas for improvement.

- **Feedback for Improvement**: Supervisor and team feedback for future placements.

Occupational Therapy Equipment Orientation & Familiarization

1. Overview of Equipment

- **Definition & Purpose**: Understanding the role of equipment in therapeutic interventions.
- **Categories**:
  - **Assistive Devices**: Tools for tasks (e.g., eating, dressing).
  - **Adaptive Equipment**: Modifies tasks/environments (e.g., grab bars).
  - **Therapeutic Tools**: Equipment for strength, coordination, and sensory processing.
  - **Rehabilitation Devices**: Restoring function (e.g., splints, mobility aids).

2. Types of Equipment

- **Assistive Technology**: Devices aiding independence (e.g., mobility aids, AAC devices).
- **Therapeutic Tools**: Tools for therapy (e.g., therapy balls, resistance bands).
- **Functional Mobility**: Tools for daily tasks (e.g., grabbers, adaptive kitchen tools).
- **Orthotics & Prosthetics**: Devices for rehabilitation (e.g., splints, prosthetics).

3. Hands-on Familiarization

- **Practical Use**: Demonstrating and practicing equipment use.
- **Fitting & Adjusting**: Tailoring equipment to client needs.
- **Safety Protocols**: Ensuring safety during equipment use.

4. Documentation & Reporting

- **Recording Use**: Documenting equipment use and progress.
- **Tracking Progress**: Monitoring patient outcomes with equipment.
- **Patient Education**: Teaching clients proper equipment use.

5. Clinical Applications & Adaptation

- **Tailoring Equipment**: Adapting tools to meet client needs.
- **Environmental Modifications**: Assessing and recommending home/workplace adjustments.

6. Equipment Maintenance & Care

- **Cleaning & Sanitizing**: Ensuring hygiene and safety.
- **Regular Maintenance**: Checking for wear and tear.

7. Documentation & Referral Procedures

- **Equipment Orders**: Understanding referral and ordering processes.
- **Insurance & Funding**: Navigating insurance and funding options for equipment.

8. Cultural Competence & Patient Preferences

- **Client Preferences**: Acknowledging cultural and personal preferences in equipment selection.
- **Client Education**: Educating clients in a respectful, culturally sensitive manner.

Log Book Clinical Rotation (for 3rd Semester)

Student Name: _____
Clinical Site: _____
Supervising Therapist: _____
Rotation Dates: _____
Log Book Start Date: _____
Log Book End Date: _____

Daily Log Format

For each clinical day, complete the following sections. Ensure that all entries reflect the activities, learning, and observations from the clinical rotation.

Date: _____
Clinical Supervisor's Name: _____
Patient(s) Seen: _____

1. Client Assessment and Treatment Planning

- **Assessment Conducted:**
  (e.g., occupational profile, functional assessment, sensory assessment)
  - **Type of assessment: _____**
  - **Findings/Results: _____**
  - **Goals Set: _____**

2. Intervention and Therapeutic Activities

- **Interventions Provided:**
  (e.g., ADL training, sensory integration, cognitive interventions, exercise)
  - **Therapeutic Activities: _____**
  - **Techniques Used: _____**
  - **Equipment Used: _____**
  - **Patient's Response: _____**

3. Assistive Technology and Equipment Use

- **Equipment Familiarized With:**
  (e.g., adaptive tools, mobility aids, splints)
  - **Equipment Used: _____**
  - **Patient Training on Equipment:**
  - **Adjustments/Fitting Made: _____**
  - **Effectiveness: _____**

4. Collaboration and Teamwork

- **Interdisciplinary Team Communication:**
  (e.g., team meeting, case discussion, collaborative care)
  - **Discussion Points:** _____
  - **Team Involvement:** _____

5. Documentation

- **Progress Notes:**
  (e.g., patient response, adjustments, changes in goals)
  - **Summary of Documentation Completed:** _____
  - **Patient's Progress:** _____

6. Supervision and Feedback

- **Feedback from Supervisor:**
  - **Strengths Identified:** _____
  - **Areas for Improvement:** _____

7. Reflection and Learning

- **Skills Learned/Improved:**
  (e.g., therapeutic techniques, communication skills, equipment familiarity)
  - **Key Learning from Today:** _____
  - **Challenges Faced:** _____
  - **Plans for Next Day:** _____

Weekly Reflection

At the end of each week, reflect on the following:

Week Ending Date: _____

1. **Progress on Learning Objectives:**
   - What have I learned this week?
   - Have I met my goals for the week?
2. **Supervision Feedback:**
   - How did I use supervisor feedback to improve my practice?
3. **Clinical Skills and Competence:**
   - Which clinical skills have I developed?
   - What areas need more focus or practice?
4. **Collaborative Skills:**
   - How effectively did I communicate with the interdisciplinary team?
   - How can I improve teamwork and collaboration?
5. **Client Interaction:**
   - How have I improved my client-centered practice?
   - How did I adapt interventions to meet client needs?

End of Rotation Evaluation

At the end of the clinical rotation, provide an overall assessment of your progress:

1. **Skills Acquired:**
    - What new skills did I acquire during the rotation?
2. **Treatment Planning and Implementation:**
    - How effectively have I participated in treatment planning and providing interventions?
3. **Use of Occupational Therapy Equipment:**
    - How confident am I in using, adjusting, and explaining OT equipment to clients?
4. **Cultural Competence:**
    - How did I ensure that cultural considerations were part of my treatment approach?
5. **Ethical Practice and Professionalism:**
    - How have I demonstrated professionalism and ethical behavior?
6. **Overall Reflection:**
    - What has been the most rewarding aspect of this rotation?
    - What challenges did I face, and how can I improve moving forward?

Signature of Student: _____
Signature of Supervisor: _____
Date: _____

ACTIVITIES OF DAILY LIVINGS

Credit Hrs. 3 (2+1)

Teaching Objectives:

- Understand the role of ADLs in determining a person's functional independence.
- Learn how to assess and analyze the ability of patients to perform ADLs (e.g., dressing, grooming, eating, bathing).
- Develop therapeutic strategies to improve or restore patients' ability to perform ADLs.
- Understand the role of environmental modifications and adaptive equipment in supporting ADL performance.

Observation:

- Observe a therapist working with clients who have difficulties performing ADLs, paying attention to strategies used to facilitate independence.
- Attend a therapy session where the therapist demonstrates adaptive equipment or environmental modifications to improve ADL performance.
- Observe clients engaging in ADLs in a clinic or home setting, noting challenges and interventions.

Skills Evaluation:

- Perform an ADL assessment on a patient, noting any areas of difficulty.
- Design and implement an intervention to improve a patient's ability to perform ADLs.
- Recommend adaptive devices or environmental modifications to aid a patient in performing ADLs.
- Create a report detailing a patient's ADL capabilities and providing therapeutic recommendations.

Course Content:	MCQs	SEQs	OSPE
I. Introduction to ADLs i. Definition and Importance of ADLs in Occupational Therapy a. ADLs as essential components of occupational performance b. Impact of ADL independence on quality of life and well-being ii. Classification of ADLs a. Basic ADLs b. Instrumental ADLs iii. Role of Occupational Therapists in ADL Training a. Enabling participation through adaptation, education, and rehabilitation b. Addressing physical, cognitive, psychosocial, and environmental barriers iv. Occupational Performance and Engagement a. The relationship between ADLs, habits, routines, and roles b. The impact of motivation and volition in ADL participation	05	01	
II. Assessment of ADLs i. Standardized Assessment Tools	03		

a. Barthel Index b. Katz Index of Independence in ADLs c. Functional Independence Measure (FIM) d. Lawton IADL Scale e. Canadian Occupational Performance Measure (COPM) ii. Observation and Client Interview Techniques a. Subjective vs. objective assessment methods b. Client-centered assessment and goal setting iii. Clinical Reasoning in ADL Assessment a. Task analysis and identifying barriers b. Predicting functional outcomes and planning interventions			
III. Models of Human Occupation (MOHO) and Theoretical Frameworks i. MOHO and its Application in ADL Training ii. Volition, habituation, and performance capacity in ADLs iii. Other Models Relevant to ADLs iv. Person-Environment-Occupation-Performance (PEOP) Model v. Canadian Model of Occupational Performance and Engagement (CMOP-E) vi. Biopsychosocial and holistic approaches in ADL training	03		
IV. Basic ADLs (Self-Care Activities) i. Personal Hygiene and Grooming a. Brushing teeth, shaving, skincare, haircare b. Adaptive equipment (e.g., one-handed grooming aids, suction toothbrushes) c. Strategies for individuals with sensory processing disorders ii. Dressing and Undressing a. Dressing techniques for different disabilities (e.g., hemiplegia, arthritis, spinal cord injury) b. Use of assistive devices (e.g., button hook, zipper pull, dressing stick) c. Clothing adaptations for ease of use iii. Feeding and Eating a. Adaptive utensils and feeding techniques for various conditions (e.g., dysphagia, tremors, stroke) b. Strategies for sensory-based feeding challenges (e.g., autism, dementia) c. Role of OTs in positioning, posture, and mealtime routines	05	01	01

iv. Toileting and Bladder/Bowel Management a. Proper positioning and hygiene techniques b. Use of assistive devices (e.g., raised toilet seats, commodes, catheter care) c. Addressing incontinence management v. Bathing and Showering a. Techniques for independent bathing and hygiene maintenance b. Adaptive equipment (e.g., grab bars, shower chairs, long-handled sponges) c. Strategies for individuals with cognitive impairments (e.g., dementia) vi. Sexual Expression and activity a. Understanding Sexuality in Occupational Therapy 1. Sexual health as a vital component of quality of life 2. Addressing sexual expression across different disabilities and life stages b. OT's Role in Sexual Health and Function 1. Addressing barriers (physical, cognitive, emotional) to sexual participation 2. Positioning techniques and adaptive equipment for individuals with mobility limitations 3. Sensory-based interventions for individuals with sensory processing challenges c. Cultural and Ethical Considerations 1. Privacy, consent, and respectful communication in sexual health discussions 2. Addressing cultural and religious beliefs about sexuality d. Intervention Strategies for Different Conditions 1. Sexual activity after spinal cord injury, stroke, arthritis, and other conditions 2. Strategies for clients with cognitive impairments (e.g., dementia, traumatic brain injury) 3. Counseling and education for individuals and caregivers			
V. Instrumental ADLs (IADLs) i. Meal Preparation and Nutrition Management a. Safe cooking techniques for individuals with disabilities b. Meal planning and grocery shopping for various functional levels c. Assistive kitchen tools and ergonomic techniques ii. Household Management and Cleaning a. Energy conservation and work simplification strategies b. Laundry, cleaning, and home organization for individuals	05	01	01

with functional limitations iii Money Management and Financial Independence a. Budgeting, paying bills, and banking strategies b. Cognitive adaptations for individuals with memory impairments iv.Medication Management a. Techniques to enhance medication adherence (e.g., reminders, pill organizers) b. Strategies for clients with cognitive impairments or visual deficits v.Community Mobility and Transportation a. Use of public transportation for individuals with disabilities b. Wheelchair and mobility aid training in community settings c. Driving rehabilitation and alternative transportation solutions vi.Shopping and Errands a. Planning and executing shopping tasks independently b. Use of mobility aids and digital accessibility tools			
VI. ADL Training Strategies and Interventions i. Task Analysis and Activity Grading a. Breaking down tasks for progressive skill-building b. Adjusting task complexity based on client ability ii. Adaptive Equipment and Assistive Technology a. Use of technology (e.g., smart home devices, voice-activated controls) b. Personalized adaptive tools for daily living tasks iii. Compensatory vs. Restorative Approaches a. Adapting vs. restoring function in ADL training iv. Environmental Modifications for ADL Independence b. Home modifications (e.g., ramps, accessible kitchens) c. Safety adaptations for fall prevention v.Cognitive and Perceptual Strategies in ADL Training a. Techniques for individuals with dementia, TBI, or visual impairments	03	01	01

b. Memory aids and structured routines for cognitive support			
VII. Psychosocial and Cultural Considerations in ADLs i.Impact of Mental Health on ADLs a. Anxiety, depression, and motivation in ADL participation ii.Cultural and Religious Influences on ADL Engagement a. Understanding culturally appropriate ADL routines b. Incorporating cultural competence in interventions iii.Motivational Strategies for ADL Participation a. Client-centered goal setting b. Behavioral interventions to enhance engagement	03	01	
VIII. Clinical Practice and Case Studies i. Hands-On Training in Simulated Environments a. Using OT labs with adapted home settings b. Practicing assessment and intervention planning ii. ADL Training in Various Settings a. Hospital, rehabilitation, community-based therapy, and home visits iii. Case Studies and Problem-Solving Exercises a. Real-life scenarios to develop clinical reasoning	03		

Recommended books:

1. occupational therapy tool kit by saint Elizabeth 6th edition
2. International Handbook of Occupational Therapy Interventions

Community Based Medicine Rehabilitation & Occupational Health
Cr. Hrs 2 (2-0)

Teaching Objectives:

- Develop an understanding of how occupational therapy is integrated within community-based rehabilitation and occupational health.
- Understand the various models of community health and rehabilitation, and their relevance to occupational therapy practices.
- Develop skills to design and implement community rehabilitation programs.
- Learn the principles of occupational health, including ergonomic assessments, injury prevention, and wellness promotion in the community.

Observation:

- Observe a community-based rehabilitation program or public health initiative.
- Shadow a professional in community health settings (e.g., public health clinics, rehabilitation centers).
- Evaluate how occupational therapists assess and address community health needs.

Skills Evaluation:

- Conduct a community health needs assessment.
- Develop a community-based intervention plan.
- Perform an ergonomic assessment in a workplace or home environment.
- Demonstrate the ability to communicate and work with community health teams.

Course Content		MCQ	SEQ
1. Introduction	• Definition and Scope of Community-Based Medicine & Rehabilitation • Role of Occupational Therapy in Community Health • Principles of Occupational Health and Workplace Safety • Importance of a Multidisciplinary Approach in Public Health	05	1
2. Environmental sanitation & medical entomology	• Public Health Significance of Environmental Sanitation • Waste Management and Water Purification Techniques • Vector-Borne Diseases (Malaria, Dengue, Leishmaniasis) • Control and Prevention Strategies for Disease-Causing Vectors	05	1
3. Genetics	• Basic Concepts of Human Genetics and Hereditary Diseases • Genetic Screening and Risk Assessment in Public Health • Impact of Genetic Disorders on Rehabilitation Strategies • Ethical Considerations in Genetic Testing and Counseling	02	

4. General epidemiology descriptive epidemiology	• Basic Concepts and Applications of Epidemiology • Descriptive Epidemiology: Patterns and Distribution of Diseases • Systemic Epidemiology and Its Role in Community Health • Types of Epidemiological Trials and Their Applications	03	
5. Analytical epidemiology	• Case-Control and Cohort Studies • Measures of Disease Occurrence (Incidence, Prevalence) • Risk Factors and Disease Associations in Public Health • Identifying and Addressing Bias in Epidemiological Studies	02	1
6. Experimental epidemiology randomized control trial systemic epidemiology	• Purpose and Methodology of Experimental Studies • Designing and Conducting RCTs in Public Health Research • Blinding, Randomization, and Ethical Considerations • Application of RCTs in Occupational Health and Rehabilitation	02	01
7.Communicable and non-communicable diseases of public health importance	• Major Communicable Diseases (HIV/AIDS, Tuberculosis, COVID-19, Hepatitis) • Non-Communicable Diseases (Diabetes, Hypertension, Stroke, Cancer) • Occupational and Work-Related Health Conditions • Prevention, Management, and Rehabilitation Strategies	05	1
8.Health policies and programs	• National and International Health Policies (WHO, SDGs) • Occupational Health and Safety Regulations • Universal Healthcare Coverage and Public Health Financing • Policy Impact on Community-Based Healthcare and Rehabilitation	03	0.5
9.Program development	• Planning and Implementation of Public Health Programs • Community-Based Rehabilitation (CBR) Framework • Monitoring and Evaluating Health Programs • Advocacy and Policy Development for Public Health Improvement	03	0.5

Recommended books:

1. Occupational Therapy in Community-Based Practice Settings 2nd Edition by Marjorie E. Scaffa and S. Maggie Reitz
2. Textbooks of Community Medicine, by Prof. H. A. Siddique (2nd Edition).

3. Community medicine & public health by Muhammad Ilyas
4. Parks textbook of preventive & social medicine –K Par

Embryology, Pediatrics, Developmental Pediatrics
Credit Hrs. 4 (4-0)

Teaching Objectives:

- Understand the typical and atypical developmental stages of children from birth to adolescence.
- Learn to assess developmental milestones and identify developmental delays.
- Understand common pediatric disorders such as autism, cerebral palsy, and ADHD and their impact on occupational functioning.
- Learn early intervention techniques to support optimal development in children.

Observation:

- Observe developmental assessments conducted by pediatric occupational therapists.
- Shadow an OT working with children with developmental disabilities, observing the use of play therapy and other pediatric interventions.
- Attend family counseling sessions where developmental progress and concerns are discussed.

Skills Evaluation:

- Conduct a developmental assessment of a child, identifying milestones in physical, cognitive, and emotional growth.
- Implement a therapeutic intervention plan for a child with a developmental delay.
- Provide a written report assessing a child's developmental progress.

Course Outline		MCQ	SEQ
1. Introduction to Pediatrics and Developmental Pediatrics	• Definition and Scope of Pediatrics in Occupational Therapy • Role of Occupational Therapy in Child Development • Importance of Early Intervention and Pediatric Rehabilitation	03	1
2. Explain Theories of early development	• Piaget's Cognitive Development Theory • Erikson's Psychosocial Development Theory	04	1
3. Development from Birth to Five Years	• Physical, Cognitive, Social, and Emotional Milestones • Language and Communication Development • Sensory-Motor Development and Reflex Integration • Early Signs of Developmental Delays	04	1
4. Pregnancy, Normal Prenatal, natal and post-natal period and possible complications.	• Causes of Brain Damage in Infancy and Early Childhood • Hypoxic-Ischemic Encephalopathy (HIE) and Birth Trauma	05	

5. Brain damage and its origin in children.	• Congenital Brain Anomalies and Genetic Disorders • Impact of Brain Damage on Motor and Cognitive Development		
6. Deviations neuromotor in and sensory development	• Atypical Motor Development and Neuromuscular Disorders • Sensory Processing Disorders: Hyper/Hypo Responsiveness • Common Sensory Deficits (Visual, Auditory, Vestibular, Proprioceptive) • Role of Occupational Therapy in Sensory Integration	05	1
7. Developmental disorders and differential diagnostics.	• Autism Spectrum Disorder (ASD) and ADHD • Down syndrome • Cerebral Palsy and Muscular Dystrophy • Intellectual and Learning Disabilities • Diagnostic Criteria and Assessment Tools	05	1
8. Normal somatic, psychomotor and psychological development of the child.	• Growth Patterns and Physical Development • Emotional and Social Maturity in Children • Play-Based Development and Occupational Engagement • Psychological Well-Being and Coping Mechanisms	05	1
9.Childhood diseases.	• Common Infectious Diseases (Measles, Chickenpox, Mumps) • Nutritional Deficiencies and Metabolic Disorders • Autoimmune and Chronic Pediatric Conditions (Juvenile Arthritis, Diabetes)	05	1
10. Neurological diseases in children (meningitis, epilepsy encephalitis, etc.)	• Meningitis and Its Impact on Development • Epilepsy: Causes, Types, and Management • Encephalitis and Long-Term Cognitive Effects • Role of Occupational Therapy in Neurological Rehabilitation	04	1
11. Assessment and therapeutic procedures for rehabilitation of disabled child.	• Standardized Pediatric Assessments (Peabody, Sensory Profile, PEDI) • Adaptive Equipment and Assistive Technology • Family-Centered Therapy Approaches • Strategies for Enhancing Participation in ADLs and IADLs	04	1
12. Behaviour Modifications	• Understanding Challenging Behaviors in Children • Positive Reinforcement and Applied Behavior Analysis (ABA)	04	01

	• Sensory-Based Interventions for Behavior Regulation • Social Skills Training and Emotional Regulation Techniques		
13.Introduction to Embryology	• Definition and Importance of Embryology in Occupational Therapy • Development and Occupational Performance Relationship Between Prenatal • Overview of Human Development: From Conception to Birth	02	
14. Gametogenesis and Fertilization	• Oogenesis and Spermatogenesis • Fertilization Process and Zygote Formation • Genetic and Environmental Factors Affecting Early Development	02	
15. Embryonic Development	• Early Embryonic Development • Embryonic Period (Weeks 3–8) • Fetal Development (Weeks 9–Birth) • Fetal Development (Weeks 9–Birth)	03	
16. Common Congenital Anomalies and Their Implications	• Neural Tube Defects (e.g., Spina Bifida, Anencephaly) • Musculoskeletal Disorders (e.g., Clubfoot, Limb Deficiencies) • Genetic Syndromes (e.g., Down Syndrome, Turner Syndrome) • Sensory and Neurological Conditions (e.g., Cerebral Palsy, Microcephaly)	03	01
17. Impact of Teratogens on Prenatal Development	• Environmental and Chemical Exposures (e.g., Alcohol, Drugs, Radiation) • Maternal Health Factors (e.g., Diabetes, Infections, Malnutrition) • Preventive Strategies and Early Intervention	02	01
Total		**60**	**12**

Recommended books:

1. Textbook of developmental pediatrics, developmental and behavioral pediatrics.
2. Sharjeel's Human Embryology (7th Edition)
3. Rapid Review of Embryology by Ahmed M Ayesha (1st Edition)

Supervised Clinical Rotation II

Description:
Supervised Clinical Rotation II is a key component of the fourth-year occupational therapy curriculum, offering students hands-on, real-world experience in various clinical or community-based settings. This course provides students with the opportunity to integrate the knowledge and skills they have acquired from previous courses into practical settings under the guidance and supervision of licensed occupational therapists. Students will work with patients across different age groups and conditions, including but not limited to developmental disabilities, musculoskeletal disorders, neurological conditions, and mental health issues.

The primary goal of this clinical rotation is to enhance students' clinical reasoning, assessment skills, and intervention planning while ensuring they are prepared for entry-level practice in occupational therapy.

Key Learning Objectives:

By the end of this clinical rotation, students should be able to:

1. **Assess and evaluate** patients' physical, cognitive, and psychosocial needs using standardized and non-standardized assessment tools.
2. **Develop and implement individualized treatment plans** that address patients' functional limitations and promote independence in activities of daily living (ADLs).
3. **Refine clinical skills** such as manual muscle testing, goniometry, therapeutic exercise, and adaptive techniques.
4. **Work effectively as part of a multidisciplinary team**, communicating clearly and collaboratively with other healthcare professionals (e.g., physical therapists, speech therapists, social workers).
5. **Demonstrate professional behavior** by adhering to ethical standards, maintaining patient confidentiality, and fostering positive therapeutic relationships with clients.
6. **Critically reflect** on clinical practice, recognizing areas of strength and areas requiring further development.
7. **Implement evidence-based practices** in occupational therapy interventions.

Structure and Supervision:

- **Clinical Setting**: Students will be placed in a variety of settings, such as hospitals, rehabilitation centers, outpatient clinics, schools, community health centers, and nursing homes.
- **Supervision**: Students will be supervised by a licensed and experienced occupational therapist. Supervisors will provide direct observation, feedback, and mentorship throughout the rotation. Regular supervision sessions will allow students to discuss challenges, case progress, and refine their skills.
- **Patient Interaction**: Students will have opportunities to interact with patients, complete assessments, set therapy goals, and implement interventions. They will also be responsible for documenting their assessments and interventions in patient records.
- **Reflective Practice**: Students are expected to engage in reflective practice by maintaining a clinical journal or log to document their experiences, challenges faced, and lessons learned throughout the rotation.

Key Skills Developed:

1. **Clinical Reasoning**: The ability to evaluate patient needs and determine the most effective intervention strategies.
2. **Assessment and Evaluation**: Skills in using both formal and informal assessment tools to assess physical, cognitive, sensory, and emotional functioning.
3. **Therapeutic Intervention**: Students will plan, implement, and adjust therapy interventions, including therapeutic exercises, adaptive techniques, environmental modifications, and ADL training.
4. **Communication**: Enhancing verbal and non-verbal communication skills with patients, families, and healthcare teams.
5. **Documentation**: Maintaining accurate and concise records of patient assessments, treatment plans, and progress notes.

Assessment of Clinical Rotation:

- **Direct Observation**: Supervising therapists will observe students' interactions with patients and provide real-time feedback.
- **Case Presentations**: Students may be required to present case studies of patients they've worked with, discussing their assessment process, treatment plan, and outcomes.
- **Self-Reflection**: Students will complete self-reflective exercises to assess their own learning and progress during the rotation.
- **Supervisor Evaluation**: At the end of the rotation, students will receive a formal evaluation from their supervisor. This evaluation will assess the student's professional behaviors, clinical skills, and ability to work within a healthcare team.
- **Documentation Review**: Supervisors will review the student's clinical documentation for accuracy, completeness, and clarity.

Learning Environment:

- **Multidisciplinary Collaboration**: Students will have opportunities to work in a team-oriented environment, interacting with other healthcare professionals, including physical therapists, speech-language pathologists, social workers, and nurses.
- **Diverse Populations**: Depending on the placement, students may work with a wide range of patient populations, including pediatric, adult, geriatric, and those with chronic conditions, mental health issues, or disabilities.

Evaluation and Grading:

- **Pass/Fail**: Most supervised clinical rotations are graded as pass/fail based on students' demonstration of competency in clinical skills, professional behavior, and their ability to meet the outlined learning objectives.
- **Performance Review**: The student's final grade will be based on their supervisor's evaluation, clinical skills demonstration, case presentations, self-reflections, and feedback from peers or team members.

Course Prerequisites:

- Successful completion of earlier clinical rotations (e.g., BOT 124 or other pre-requisite clinical courses).
- Completion of required theoretical courses related to assessment, intervention, and occupational therapy principles.

Log Book Clinical Rotation (for 4th Semester)

Student Name: _____
Institution Name: _____
Rotation Period: From _____ to _____
Clinical Supervisor: _____
Clinical Setting: _____

Sction 1: Patient Interaction Log

Date: _____

Patient ID/Code	Age & Gender	Diagnosis/ Condition	Interventions	Assessment Tools Used	Outcome/ Progress	Reflections/ Challenges

Section 2: Clinical Skills Development

Date: _____

Skill Practiced	Details of Practice	Feedback from Supervisor	Reflections on Improvement

Section 3: Case Presentation Log

Date: _____

Patient ID/Code	Case Description	Assessment/Intervention Plan	Outcome	Reflection on the Case

Section 4: Multidisciplinary Team Interaction

Date: _____

Team Member Role	Interaction/Collaboration	Observations/Takeaways

Section 5: Self-Reflection and Professional Growth

Date: _____

Reflection Area	Details
Clinical Strengths	What areas do you feel confident in?
Areas for Improvement	What skills or knowledge need further development?
Professionalism	How have you demonstrated professionalism and ethical behavior?
Future Goals	What specific skills or knowledge would you like to focus on next?
Patient Interaction	How did you engage with patients today? What was effective, and what could improve?

Section 6: Supervisor Feedback (End of Rotation)

Clinical Supervisor's Name: _____
Feedback on Performance:

- Clinical Skills: _____
- Professional Behavior: _____
- Teamwork and Collaboration: _____
- Documentation Skills: _____

Supervisor Comments:

- Strengths:

- Areas for Improvement:

Section 7: Final Reflection (End of Rotation)

Overall Experience and Learning:

- What were your key takeaways from this rotation?
- How have you developed your clinical and professional skills throughout the rotation?
- What are your next steps as you transition toward independent practice?

Signatures

Student Signature: _____
Supervisor Signature: _____
Date: _____