

STUDY & EVALUATION SCHEMES
OF
BACHELOR OF SCIENCE IN
RADIOLOGICAL IMAGING TECHNOLOGY(B. Sc.RIT)
(B.Sc. RIT- II SEMESTER)

[Applicable w.e.f. Academic Session 2020-21]



INTEGRAL UNIVERSITY, LUCKNOW
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Syllabus approved by Board of Study, Faculty Board, Academic Council, Executive Council of the Integral University, Lucknow

INTEGRAL UNIVERSITY, LUCKNOW
INTEGRAL INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH
DEPARTMENT OF PARAMEDICAL & HEALTH SCIENCES

STUDY & EVALUATION SCHEME
B.Sc. in RADIOLOGICAL IMAGING TECHNOLOGY (BRIT)
(w.e.f. Session 2020-21)

I -Year

II- Semester

S. No.	Code	Subject	Periods			Credits C	Evaluation Scheme				Subject Total
			L	T	P		Sessional			Exam	
							CT	TA	Total	ESE	
1.	RT108	Human Anatomy-II	2	1	0	3	40	20	60	40	100
2.	RT109	Human Physiology-II	2	1	0	3	40	20	60	40	100
3.	RT110	Radiation Hazard, Protection & Control	3	1	0	4	40	20	60	40	100
4.	RT111	Radiological Positioning-I	3	1	0	4	40	20	60	40	100
5.	RT112	Medical Law & Ethics	3	1	0	4	40	20	60	40	100
6.	LN201	Advance Professional Communication	2	1	0	3	40	20	60	40	100
7.	RT113	Human Anatomy-II Lab	0	0	2	1	40	20	60	40	100
8.	RT114	Human Physiology-II Lab	0	0	2	1	40	20	60	40	100
9.	RT115	Radiation Hazard, Protection & Control-Lab	0	0	2	1	40	20	60	40	100
10.	RT116	Radiological Positioning-I –Lab	0	0	2	1	40	20	60	40	100
Total			16	06	08	25	400	200	600	400	1000

L: Lecture

T: Tutorials

P: Practical

CT: Class

Test

TA: Teacher Assessment

ESE: End Semester Examination

Sessional Total: Class Test + Teacher Assessment

Subject Total: Sessional Total + End Semester Examination (ESE)

SUBJECT: HUMAN ANATOMY- II

SUBJECT CODE: RT108

(w.e.f. July 2020)

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LEARNING OBJECTIVE:

This syllabus is extension of the part-I. The syllabus justifiably divides the body systems into two semesters to ensure complete and comprehensive knowledge of all functionalities of the body.

UNIT I- RESPIRATORY SYSTEM: (10Hours)

1. Orientation of Thoracic cage- boundaries, inlet, outlet & wall
2. Intercostal muscles - origin, insertion, nerve supply
3. Diaphragm - origin, insertion, nerve supply
4. Nose, pharynx, Larynx-- extent, walls. enumerate associated cartilages & muscles
5. Trachea- extent & brief structure, concept of Tracheobronchial tree
6. Lungs- Surfaces, borders, lobes, fissures
7. Joints of Thorax- enumerate and its type

UNIT II – DIGESTIVE SYSTEM: (10Hours)

1. Oral cavity (boundaries), tongue - parts, enumerate muscles & papillae, salivary glands- brief enumerate & discuss in brief its opening)
2. Pharynx (extent, parts & boundaries) and Oesophagus (parts, extent, constrictions, sphincters)
3. Stomach - location, parts, surfaces, curvatures, nerve supply
4. Small Intestine parts, difference between duodenum, jejunum & ileum, nerve supply
5. Large intestine - parts & their features in brief
6. Liver- location, surfaces, border, lobes, Gall bladder-location, parts & function, Pancreas -location, parts, surfaces, borders & its ducts
7. Blood vessel and layers of GIT

UNIT III - URINARY SYSTEM: (6Hours)

1. Introduction and Parts of Urinary system
2. Kidney- Structure (surfaces, poles, borders, hilum) & function
3. Structure of nephron
4. Ureter(length, parts, constrictions), Urinary bladder(location, capacity, surfaces, borders, parts, openings) and Urethra (parts)

UNIT IV- ENDOCRINE GLAND: (7Hours)

1. Introduction and function of Endocrine Gland
2. Pituitary gland- location, parts, enumerate types of cells & hormones secreted
3. Thyroid gland- location, parts, features & blood supply
4. Parathyroid gland - location, enumerate types of cells & hormone secreted
5. Adrenal gland- location, shape, enumerate its components & hormones

UNIT V – LYMPHATIC SYSTEM:**(7Hours)**

1. Introduction to Lymphatic System
2. Lymph nodes- structure and functions
3. Spleen - location, surfaces, borders, poles, hilum
4. Thymus - location, structure & functions
5. Tonsil – types according to location, palatine tonsil in brief

LEARNING OUTCOME:

This curriculum can stimulate the students to understand the basic anatomy of included system and the resultant unified organization thereupon.

RECOMMENDED BOOKS:

1. Ross & Wilson,(2014),Anatomy & Physiology in health & illness,11th edition, Elsevier Publications
2. Chaurasia B D, (2016), Human Anatomy, 7th edition, CBS publishers
3. Gerard J. Tortora and Bryan H. Derrickson, (Principles of Anatomy and Physiology,14th edition, Wiley publications.

SUBJECT: HUMAN PHYSIOLOGY-II

SUBJECT CODE: RT109

(w.e.f. July 2020)

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LEARNING OBJECTIVE:

This subject imparts the knowledge of the structure and function of included organs and organ systems in normal human body.

UNIT I-DIGESTIVE SYSTEM:

(08 Hours)

1. Digestive system introduction, structure of GI wall and functions.
2. Basic physiology of organs of digestive system (Salivary glands, Gastric glands, Pancreas, Liver, Gall bladder).
3. Physiological functions of Liver
4. Digestion and Absorption of carbohydrate, fat and proteins.

UNIT II- CENTRAL NERVOUS SYSTEM:

(06 Hours)

1. Nervous System: general organization of CNS, function of important structure and spinal cord, neuron, nerve impulse , type of nerves according to function, Autonomic nervous system- organization & function
2. Special senses- general organization & functions

UNIT III- - ENDOCRINE GLAND:

(12Hours)

1. Introduction of Endocrine system
2. Physiological Functions of Glucagon, Prolactin, Growth Hormones, insulin, oxytocin, ADH, Adrenal PTH, Thyroxin, calcitonin, Vitamin D.

UNIT IV- REPRODUCTIVE SYSTEM:

(08Hours)

1. Introduction of Reproductive Systems in human
2. Spermatogenesis and Oogenesis
3. Physiological functions of Male and female Reproductive Hormones.
4. Menstrual Cycle
5. Placental Hormone (Physiological Function)

UNIT V- EXCRETORY SYSTEM:

(06Hours)

Functions anatomy of Kidneys, Urine formation, (Glomerular filtration and tubular Reabsorption), Electrolytes: their balances and imbalances Introduction of acidosis and alkalosis.

LEARNING OUTCOME:

Students will able to understand functioning of various systems as well as it's applied aspects.

RECOMMENDED BOOKS:

1. Guyton and Hall,(2011) Textbook of Medical Physiology,12th Edition, Saunder/Elsevier.
2. Sujit Chaudhury, (2011),Concise Medical Physiology, 6th edition, NCBA
3. Sembulingam k,(2012),Essentials of Medical Physiology,6th edition, Jaypee Publications
4. Gerard J. Tortora and Bryan H.Derrickson, (Principles of Anatomy and Physiology,14th edition,Wiley publications.

SUBJECT: RADIATION HAZARDS, PROTECTION AND CONTROL

SUBJECT CODE: RT110

(w.e.f. July 2020)

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LEARNING OBJECTIVE:

The objective is to learn aim, objective, philosophy and principle of radiation protection to protect oneself from biological effect of radiation and monitoring of radiation exposure.

UNIT I- RADIATION HAZARDS, PROTECTION: (8Hours)

1. Radiation protection: Definition of radiation hazards
2. Principle, history & development - National & international agencies; AERB, BARC, ICRP, WHO, IAEA and their role
3. Sources of radiation-natural-man made & internal exposures;
4. Permissible dose levels on and around sealed source housing and installation principles of radiation protection

UNIT- II- METHODS TO REDUCE RADIATION: (8Hours)

1. Wedge filters, wedge angle, hinge angle
2. Compensator beams flattening filters, scattering foils
3. Physical properties of phantom materials, bolus and substitutes
4. Factor used for treatment dose calculations, Daily treatment time and monitor units calculation

UNIT III -PLANNING OF RADIATION INSTALLATION: (8Hours)

1. Protection from primary, leakage and scattered radiation
2. Concepts of work load use factor, occupancy factor & distance
3. Barrier design- barrier materials-concrete, brick& lead, Primary & secondary barrier design calculations
4. Design of doors. Control of radiation-effects of time, distance and shielding

UNIT IV -PERSONNEL MONITORING SYSTEMS: (8Hours)

1. Principle and objective film badge guidelines for use thermoluminescent dosimeter badge pocket dosimeter
2. Area monitoring and radiation survey, practical use of survey meter, zone monitors and phantoms
3. Survey in teletherapy, brachytherapy and simulator units

UNIT V -BIOLOGICAL ASPECTS OF RADIOLOGICAL PROTECTION: (8Hours)

1. Biological effects of radiation
2. Direct & Indirect actions of radiation
3. Concept of detriment, Deterministic & stochastic effect of radiation somatic and genetic effects
4. Dose relationship and Effects of antenatal exposure

LEARNING OUTCOME:

At the end of the course, student will have knowledge on:

- Radiobiology and its energy determinants.
- Quality control and assessment of equipments installed in radio department.
- Layout planning of radiology department according to ICRP, AERB recommendation.

RECOMMENDED BOOKS:

1. Sherer MA, Visconti PJ, Ritenour ER, Haynes K. Radiation Protection in Medical Radiography-E-Book. Elsevier Health Sciences; 2014 Mar 12.
2. Brandon AN, Hill DR. Selected list of books and journals in allied health. Bulletin of the Medical Library Association. 1996.
3. Long BW, Frank ED, Ehrlich RA. Radiography Essentials for Limited Practice-E-Book. Elsevier Health Sciences; 2016 Sep 6.
4. Durrani SA, Ilic R, editors. Radon measurements by etched track detectors: applications in radiation protection, earth sciences and the environment. world scientific.
5. Turner JE. Atoms, radiation, and radiation protection. John Wiley & Sons; 2008 Jan 8.
6. www.AERB.com (Guidelines and Details of Quality Control in Radiology).

SUBJECT NAME: RADIOGRAPHIC POSITIONING-I

SUBJECT CODE: RT111

(w.e.f. July 2020)

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LEARNING OBJECTIVE:

The objective is to learn basic and special projections for the better and delineation diagnosis of the disease conditions of different anatomical structure.

UNIT – I: SKULL:

(8 Hours)

1. Cranial bones and facial bones

- Related radiological anatomy

2. Basic & special projections

- Cranium Base of skull, Sella turcica, Mastoids, Optic foramina and Orbits, Nasal bone, TM joint, Facial bone, Zygomatic arches, Mandible, Para nasal sinuses

UNIT –II: NECK:

(8 Hours)

- Related radiological anatomy

- Positioning- AP, LAT

UNIT-III: THORAX:

(8 Hours)

- Related radiological anatomy

- Chest X-ray –AP, LAT

- Special projections

UNIT IV: ABDOMEN:

(8 Hours)

- Related radiological anatomy.

Basic & special projection

- Basic: AP supine (KUB)

- Special: PA prone, lateral decubitus, Erect AP, Dorsal decubitus, Lateral

- Acute abdomen: three way series

UNIT V: KUB:

(8 Hours)

- Related radiological anatomy

- Positioning- AP.

LEARNING OUTCOME:

At the end of the course, student will be expert in practicing various radiographic positioning and procedure independently and understanding the radiographic diagnosis.

RECOMMENDED BOOKS:

1. Whitley AS, Jefferson G, Holmes K, Sloane C, Anderson C, Hoadley G. Clark's
2. Positioning in Radiography 13E. CRC Press; 2015 Jul 28.
3. Bontrager KL, Lampignano J. Textbook of Radiographic Positioning and Related
4. Anatomy-E-Book. Elsevier Health Sciences; 2013 Aug 7.
5. Bontrager KL, Lampignano J. Bontrager's Handbook of Radiographic Positioning and
6. Techniques-E-BOOK. Elsevier Health Sciences; 2017 Feb 10.
7. Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and
8. Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.

SUBJECT: MEDICAL LAW & ETHICS
SUBJECT CODE: RT112
(w.e.f. July 2020)

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LEARNING OBJECTIVE:

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

UNIT-I: (8 Hours)

1. Medical ethics, Definition, Goal, Scope.
2. Introduction to Code of conduct
3. Basic principles of medical ethics, Confidentiality
4. Malpractice and negligence, Rational and irrational drug therapy

UNIT-II: (8 Hours)

1. Autonomy and informed consent.
2. Right of patients Care of the terminally ill.
3. Euthanasia Organ transplantation, ethics and law.

UNIT-III: (8 Hours)

1. Medico legal aspects of medical records, Medico legal case and type.
2. Records and document related to MLC ownership of medical records.
3. Confidentiality Privilege communication, Release of medical information.
4. Unauthorized disclosure, retention of medical records, other various aspects.

UNIT-IV: (8 Hours)

1. Professional Indemnity insurance policy.
2. Development of standardized protocol to avoid near miss or sentinel events obtaining an informed consent.

UNIT-II: (8 Hours)

1. Basics of emergency care and life support skill
2. Vital signs and primary assessment, Basic emergency care, first aid and triage
3. Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods
4. One and Two rescuer CPR, Using an AED (Automated external defibrillator), Managing an emergency including moving a patient

LEARNING OUTCOME:

Student will abide by the rule and regulation of the medicine and have abundant knowledge on professional attitude and communication among the colleague, patients and co-parties.

RECOMMENDED BOOKS:

1. Kennedy I, Grubb A. Medical law. London: Butterworths; 2000.
2. Jackson E. Medical law: text, cases, and materials. Oxford University Press.
3. Recent Trends in Medical Imaging (CT, MRI and USG)
4. Bontrager KL, Lampignano J. Bontrager's Handbook of Radiographic Positioning and Techniques-E-BOOK. Elsevier Health Sciences; 2017 Feb 10.
5. Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.

SUBJECT: ADVANCE PROFESSIONAL COMMUNICATION

SUBJECT CODE: LN201

(w.e.f. July 2020)

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LEARNING OBJECTIVE:

To comprehend and communicate in simple English.

UNIT I: READING & LISTENING COMPREHENSION: (7 hours)

Ways to improve the Speed & Efficiency of Reading, Importance of Skim Reading, Listening Skills & Features of Effective Listening, Benefits of Effective Listening

UNIT II: WRITING SKILLS: (7 hours)

C V & Resume writing, Job Application letter/Covering letter, Precis: Principles of Condensation Paragraph writing, Development of Paragraph

UNIT III: GROUP DISCUSSION AND INTERVIEW SKILLS: (7 hours)

Group Discussion: Meaning & Significance, How to prepare & practice for GD, Common Pitfalls in a GD Interview: Definition, Skills & Techniques, Preparation, and Negative Interview Factors & Interview Tips

UNIT IV: PRESENTATION SKILLS: (7 hours)

Presentation Strategies: Purpose, Audience and Locale, Organizing Contents, Audio-Visual Aids, Nuances of Delivery, Body Language, Voice Dynamics.

UNIT V: PROJECT WORK: (4 hours)

At the commencement of the semester, the student would be assigned a topic by the Teacher/Instructor. They will research it & submit a duly documented report of about 20- 25 pages by the end of the semester.

LEARNING OUTCOME:

Students will realize the significance of English for their career progression. Benchmarking the students in the first semester to observe their progression in terms of LSRW. Students will be able to understand distinct sounds and improve pronunciation. Students will improve their English vocabulary of daily usage. Students will be able to form simple sentences to talk about themselves, friends and relatives. Students will be able to imbibe the pre-requisites of personality development.

RECOMMENDED BOOKS:

1. Raman, Meenakshi & Sharma, Sangeeta. Technical Communication: Principles and Practice, Oxford University Press-2013
2. Konar, Nira. Communication Skills For Professionals, PHI Learning Pvt. Ltd - 2011
3. Board of Editors. Written and Spoken Communication in English, University Press-2007
4. Lata , Pushp & Kumar, Sanjay .Communicate or Collapse :A Handbook of Effective Public Speaking , Group Discussions and Interviews, PHI Learning Pvt. Ltd -2011
5. Duck, Steve & McMahan, David T. The Basics of Communication : A Relational Perspective, Sage Publication-2012
6. Laws, Anne- Presentations, Orient Black Swan-2011
7. O'Connor, J. D. Better English Pronunciation, Universal Books Stall-1991
8. Anderson, Marilyn, Nayar, Pramod K. & Sen, Madhuchhanda .Critical Thinking, Academic Writing and Presentation Skills, Pearson-2009.

SUBJECT NAME: HUMAN ANATOMY- II LAB

SUBJECT CODE: RT113

(w.e.f. July 2020)

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PRACTICAL:

Thorax:

- Sternum
- Ribs
- Vertebrae
- Demonstration of Lungs
- Demonstration of Chest X-ray.

Abdomen:

1. Lumbar vertebrae
2. Stomach
3. Liver, Gall bladder and Pancreas
4. Intestine

Urinary system:

1. Sacrum
2. Articulated Pelvis
3. Kidney & Urinary bladder

Head:

1. Skull – Identification of bones.

RECOMMENDED BOOKS:

1. Ross & Wilson,(2014),Anatomy & Physiology in health & illness,11th edition, Elsevier Publications
2. Chaurasia B D, (2016), Human Anatomy, 7th edition, CBS publishers
3. Gerard J. Tortora and Bryan H. Derrickson, (Principles of Anatomy and Physiology,14th edition, Wiley publications.

SUBJECT NAME: HUMAN PHYSIOLOGY- II LAB
SUBJECT CODE: RT114
(w.e.f. July 2020)

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PRACTICAL:

1. History taking and general examination.
2. Examination of Pulse.
3. Measurement of Blood Pressure.
4. Auscultation for heart sounds and normal respiratory sounds.
5. To study about intrauterine contraceptive devices.
6. To measure temperature
7. Calculation & evaluation of daily energy & nutrient intake.

RECOMMENDED BOOKS:

1. Guyton and Hall,(2011) Textbook of Medical Physiology,12th Edition, Saunder/Elsevier.
2. Sujit Chaudhury, (2011),Concise Medical Physiology, 6th edition, NCBA
3. Sembulingam k,(2012),Essentials of Medical Physiology,6th edition, Jaypee Publications
4. Gerard J. Tortora and Bryan H.Derrickson, (Principles of Anatomy and Physiology,14th edition,Wiley publications.

**SUBJECT NAME: RADIATION HAZARD, PROTECTION &
CONTROL-LAB
SUBJECT CODE: RT115
(w.e.f. July 2020)**

**L T P
0 0 2**

PRACTICAL:

1. Method of Radiation Hazards, Protection.
2. Method of Reduce Radiation.
3. Method of Planning of radiation installation.
4. Method of Personnel Monitoring Systems.
5. Method of Biological of Radiological Protection.

RECOMMENDED BOOKS:

1. Sherer MA, Visconti PJ, Ritenour ER, Haynes K. Radiation Protection in Medical Radiography-E-Book. Elsevier Health Sciences; 2014 Mar 12.
2. Brandon AN, Hill DR. Selected list of books and journals in allied health. Bulletin of the Medical Library Association. 1996.
3. Long BW, Frank ED, Ehrlich RA. Radiography Essentials for Limited Practice-E-Book. Elsevier Health Sciences; 2016 Sep 6.
4. Durrani SA, Ilic R, editors. Radon measurements by etched track detectors: applications in radiation protection, earth sciences and the environment. world scientific.
5. Turner JE. Atoms, radiation, and radiation protection. John Wiley & Sons; 2008 Jan 8.
6. www.AERB.com (Guidelines and Details of Quality Control in Radiology).

SUBJECT NAME: RADIOGRAPHIC POSITIONING- I LAB

SUBJECT CODE: RT116

(w.e.f. July 2020)

**L T P
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PRACTICAL:

SKULL:

- Cranial bones and facial bones
- Basic & special projections
- Related radiological Pathology

NECK, THORAX & ABDOMEN:

- Basic & special projection
- Related radiological Pathology

KUB:

- Basic & special projection
- Related radiological Pathology

RECOMMENDED BOOKS:

1. Whitley AS, Jefferson G, Holmes K, Sloane C, Anderson C, Hoadley G. Clark's Positioning in Radiography 13E. CRC Press; 2015 Jul 28.
2. Bontrager KL, Lampignano J. Textbook of Radiographic Positioning and Related Anatomy-E-Book. Elsevier Health Sciences; 2013 Aug 7.
3. Bontrager KL, Lampignano J. Bontrager's Handbook of Radiographic Positioning and Techniques-E-BOOK. Elsevier Health Sciences; 2017 Feb 10.
4. Frank ED, Long BW, Smith BJ. Merrill's Atlas of Radiographic Positioning and Procedures-E-Book. Elsevier Health Sciences; 2013 Aug 13.