YENEPOYA

(DEEMED TO BE UNIVERSITY)
Recognized under Sec 3(A) of the UGC Act 1956
Accredited by NAAC with 'A' Grade

# YENEPOYA (DEEMED TO BE UNIVERSITY)

**Deralakatte, Mangaluru -575018**

## REGULATIONS AND CURRICULUM GOVERNING

## UNDERGRADUATE PROGRAM
## B.Sc RENAL DIALYSIS TECHNOLOGY

**(REVISED CURRICULUM – AMENDED UP TO 2020)**

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Office of the Registrar
University Road
Deralakatte
Mangalore - 575018
Ph: 0824-2204667/68/69/71
Fax: 0824-2203943

Ref: No. Y/REG/ACA/38-ACM/2020 14.05.2020

**NOTIFICATION – 38-ACM/12 /2020 dtd. 14.05.2020**

Sub: Revised curriculum of the existing B.Sc. (Tech) programmes and Starting of additional programmes under the Faculty of Allied and Healthcare Professions

Ref: Resolution of the Academic council at its 38th meeting held on 27.04.2020, vide agenda - 23

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The Academic Council at its 38th meeting held on 27.04.2020 and subsequently the Board of Management at its 49th meeting held on 30.04.2020 have resolved to approve the revised curricula and regulations of existing 08 B.Sc. Technology Programmes (Anaesthesia & O.T. Technology, Renal Dialysis Technology, Respiratory Care Technology, Medical Laboratory Technology, Medical Imaging Technology, Cardio Vascular Technology, Perfusion Technology, Optometry Technology) and starting of 04 new programmes under the Faculty of Allied & Healthcare Professions

1. B.Sc. in Physician Assistant
2. B.Sc. in Clinical Psychology
3. B.Sc. in Emergency Medicine Technology
4. B.Sc. in Neuro Science Technology

All these programmes shall follow Choice Based Credit System.

This notification will supersede all the earlier notifications issued on this subject.

**REGISTRAR**

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CC to:

1. Dean, Faculty of Allied and Healthcare Professions
2. Controller of Examinations
3. File copy

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**Yenepoya (Deemed to be) University,**

**Regulations & programme curriculum for**

**B.Sc. Renal Dialysis Technology under Choice Based Credit System.**

## 5. Preamble

Health care sector has become one of the largest employment generation sectors in India and abroad. Rapidly changing and expanding horizon of the health care sector demands formal training programs in all its allied areas. Advanced complex instrumentation & equipment require technologists not only to operate but also to care & maintain these instruments and equipment. These technologists should possess a strong scientific foundation to be able to perform these tasks at a much higher level than the traditionally trained technicians of the past used to perform. The students who are trained in the technological aspects of medical care with a good scientific foundation will be in a position to competently assist the Physician or Surgeon. Hence to prepare the students to meet the demands of the healthcare sector and in accordance with Ministry of Human Resource Development (HRD), Govt. of India education system, Choice based Credit system is introduced from the academic year 2020- 21 onwards.

The Renal Dialysis Technology degree combines subjects from health sciences and science providing students with a general foundation in the healthcare environment, along with foundation studies in dialysis technology. From your Under Graduate Programme you build on this foundation knowledge with the different medical concepts of the kidney, principles of dialysis, dialysis systems and machines, blood chemistries, etc. You will be trained to use various machines for dialysis help in the treatment of patients during this course. It includes advanced technology and techniques in the dialysis process have evolved opening many new options for those who require frequent dialysis procedures.

Choice based Credit System is a flexible system of learning. The distinguishing features of CBCS are following:

- It permits students to learn at their own pace.
- Choose Electives from a wide range of Elective courses offered by the other departments/university.
- Undergo additional courses acquire more than the required number of credits.
- Adopt an Inter-disciplinary and Intra-disciplinary approach in learning.
- Make best use of the available expertise of the faculty across the departments or disciplines.
- Has an inbuilt evaluation system to assess the analytical and creative skills of students in addition to the conventional domain knowledge assessment pattern.

## 6. Programme Outcome:

Upon successful completion of the programme, students will developed broad knowledge of evaluation, diagnosis and management of different conditions of the eye. In particularly they will: the contribution of basic renal scientific mechanisms to clinical disorders of the excretory system.

In particular they will:

**PO 1** Apply discipline knowledge to undertake dialysis procedures in a safe and accurate environment, develop clinical practices using evidence practice research

**PO 2** Understand and apply the principles of dialysis and skills necessary to give safe and effective care to the individual undergoing hemodialysis treatments.

**PO 3** Demonstrate the use of hemodialysis equipment with an understanding of the process of operating dialysis equipment and alternate dialysis procedures.

**PO 4** Assess the patient for any complications with an understanding of the problem and recognize the need to report the complications to the physician or nephrologist.

**PO 5** Respond effectively to the physical and emotional needs of the patient undergoing dialysis treatment.

**PO 6** Develop the ability to understand operation, routine maintenance, identification of malfunction in equipment, troubleshooting and minor repair in equipment used in dialysis unit such hemodialysis machine, water treatment plant, dialyzer reprocessing machine, etc.

**PO 7** Communicate effectively and appropriately with different work groups and patient groups, taking into account age, health condition and cultural background when communicating with patients.

**PO 8** Assess and critically evaluate information independently using technological facilities to remain informed about current dialysis theories/issues; use this information appropriately in professional settings including written and oral presentations.

**PO 9** Demonstrate cognisance of current international standards within the profession and apply these in practice.

**PO 10** Manage patients in a manner that respects them as individuals, is culturally sensitive and ethically appropriate.

**PO 11** Work effectively, ethically and cognisant of medico-legal boundaries within the team; take responsibility for own actions, and is able to mentor colleagues.

**Expected skill to be acquired by the end of the programme:**

**PO 12** Actively participate in the treatment of hemodialysis including planning and scheduling.

**PO 13** Providing support within the unit in the handling of all hemodialysis and peritoneal dialysis related and patient related issues, e.g. dialysis complications, dietary consultations, psychological care and vascular access issues in coordination with the nephrologists.

**PO 14** Monitoring the dialysis patients for intra dialytic complications.

**PO 15** Guiding and teaching the students about pediatric dialysis.

**PO 16** Strictly adhere to dialysis unit policies, infection control and quality control standards as per unit polices.

**PO 17** Quality maintenance and attending procedures performed in the unit e.g. CRRT, ICU dialysis, pediatric dialysis, plasmapheresis, hemoperfusion, SCUF, and MARS.

**PO 18** Perform and conduct the regular ongoing patient education nutritional counseling programs in the dialysis unit.

**PO 19** Overall care of patient outcomes, addresses patient satisfaction scores and patient safety issues.

## 7. Duration of the Programme:

The duration of the programme shall extend over 8 semesters (three academic years with one year internship) each semester comprising minimum of 15 weeks with the minimum of 90 actual working days of instruction in each semester. The successful completion of the Undergraduate program, along with internship as applicable will lead to Bachelor's degree in Renal Dialysis Technology (B.Sc. RDT).

## 8. Semester:

An academic year shall consist of two semesters;

| | |
|---|---|
| Odd Semester 1st, 3rd, 5th & 7th | July/August to December/January |
| Even semester 2nd, 4th, 6th & 8th | January/February to June/July |

## 9. Medium of Instructions:

The medium of instruction and examination shall be English.

## 10. Eligibility for admission:

To be eligible for admission in B.Sc. Renal Dialysis Technology, a candidate should have passed two-years Pre University examination/ Pre Degree examination/ two years after ten years of schooling or its equivalent as recognized by the Yenepoya (Deemed to be) University with Physics, Chemistry and Biology as principal courses of study.

Candidate needs to secure 40% or above marks in the qualifying examination to be eligible for admission. For SC/ST/OBC candidates minimum marks required in the qualifying exam is 35% marks.

## 11. Semester System and Choice Based Credit System:

The semester system accelerates the teaching-learning process. The credit-based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice-based credit system provides a cafeteria 'type approach in which the students can take courses of their choice, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

## 12. Definition of Key words:

**12.1. Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.

**12.2. Choice Based Credit System**: The CBCS provides choice for students to select from the prescribed courses (Core, Ability Enhancement, Skill enhancement, Self-learning, Discipline Specific courses).

**12.3. Course:** Usually referred to, as "papers" is a component of a programme. The courses shall define learning objectives and learning outcomes. A course shall comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.

**12.4.** **Credits:** Credit defines the quantum of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/tutorial laboratory work and other forms of learning required, to complete the course contents in a 15 - 20 week schedule: One credit =1 hour of lecture per week/ two hours of Laboratory or practical/three hours of clinical rotation, field work/posting. All courses need not carry the same credits.

| | **Lecture - L** | **Tutorial - T** | **Practical - P** | **Clinical Training/Rotation (CT/CR)** |
|---|---|---|---|---|
| 1 Credit | 1 Hour | 1 Hour | 2 Hours | 3 – 5 Hours |

**12.5.** **Programme:** An educational program leading to award of a degree, diploma or certificate.

**12.6.** **Grade Point**: It is a numerical weight allotted to each letter grade on a 10-point scale.

**12.7.** **Credit Point**: It is the product of grade point and number of credits for a course.

**12.8.** **Cumulative Grade Point Average (CGPA)**: It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

**12.9.** **Letter Grade:** It is an index of the performance of students in a said course. Grades are denoted by letters: O, A+, A, B+, B, C, P, F, AB.

**12.10.** **Semester Grade Point Average (SGPA):** It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

**12.11.** **Transcript or Grade Card or Certificate:** Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester.

**12.12. Semester System and Choice Based Credit System:** The semester system accelerates the teaching-learning process. The credit-based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice-based credit system provides a cafeteria ‘type approach in which the students can take courses of their choice, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

## 13. Types of Courses

Courses in a programme may be of three kinds:

- Core Course
- Ability Enhancement Compulsory Course (Foundation course)
- Elective Course

**13.1. Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. This is the course which is to be compulsorily studied by a student as a core requirement to complete the program of study in a said discipline.

**13.2. Ability Enhancement Compulsory Courses (AECC):** Ability enhancement compulsory courses (AECC) are the courses based upon the content that leads to knowledge enhancement.

Example:

1. Environmental science
2. English/ MIL communication

These are mandatory for all disciplines.

**13.3. Elective Course (EC):**

12.3.1 Generic elective

12.3.2 Skill enhancement course

12.3.3 Self-learning courses (SWAYAM/MOOC)

12.3.4 Discipline Specific Elective courses

**13.3.1. Generic elective:** An Elective Course chosen from pool of courses which are unrelated from unrelated discipline/subject with intention to seek exposure beyond disciplines of choice. The purpose of this is to offer the students the option to explore disciplines of interest beyond the choices they make in core and discipline specific elective courses.

**13.3.2. Skill enhancement course:** SEC courses are value-based and/or skill- based and are aimed at providing hands-on-training, competencies and skills. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

**13.3.3. Self – learning course:** with respect to- UGC (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2021. New Delhi, the 25thMarch, 2021. Vide No.F.1-100/2016(MOOCs/e-content)

The List of MOOCS (Massive open online courses) and SWAYAM(Study webs of active learning for young aspiring minds)will be finalized by the faculty of allied health professions as per subject to time-to-time UGC no tification and will be submitted to the academic council of the DU. Yenepoya(Deemed to be university) shall adopt the regulation of UGC governing MOOCS/ SWAYAM courses as amended from time to time.

The college/ department will designate course coordinator/facilitator to guide the students throughout the course to facilitate the completion of the chosen course.

**13.3.4. Evaluation and Certification of MOOCs:**

Evaluation will be based on predefined norms and parameters and announced in the overview of the Course at the time of offering the course. Formative continuous online assessments and end of course proctored exams shall be completed by the student.

The Yenepoya (Deemed to be) University incorporate the marks/grade obtained by the student, as communicated by the Host Institution through the PI of the SWAYAM course in the marks sheet of the student that counts for final award of the degree by the University.

### 13.3.5. Credit Mobility of MOOCs:

The Yenepoya(Deemed to be) University will give the equivalent credit weightage to the students for the credits earned through online learning courses through SWAYAM platform in the credit plan of the program.

In case a student fails to complete the MOOCS course He/ She may be allowed to complete the course requirements by registering for another course online in subsequent semester or opt for a course offered at this Yenepoya (Deemed to be) University.

## 14. Assigning Credit Hours per Course

While there is flexibility for the departments in allocation of credits to various courses offered, the general formula shall be:

- Every Core course shall be restricted to a maximum of 4 credits.
- The elective course offered by the Yenepoya (Deemed to be) University shall be restricted to a maximum of 2 credits.
- A candidate shall compulsorily complete total Twelve Credits of Elective courses
- These courses shall be selected either from the Generic Electives, Skill enhancement courses offered by Yenepoya (Deemed to be) university or from the SWAYAM/MOOC/NPTEL courses notified by the UGC time to time and enlisted by the faculty of Allied Health Care Professions. A Candidate shall have freedom to choose the courses of once own choice and at their own pace from the external online platform (SWAYAM/MOOC) or a mix of courses offered by Yenepoya (Deemed to be) University but, require to complete before appearing the Sixth semester end examination.
- A candidate who is desirous to add more credits shall be permitted to do so during the academic duration. Extra credits earned by a candidate shall be included in the marks card on submission of course completion certificate. However, it shall not be considered for awarding the Grade in the UG programme.
- The credits assigned to the course is indicated as L: T: P format. For example, for a 4credit course format could be: 4:0:0 or 1:2:1 or 3:1:0 or 0:0:4etc.

## 15. Assigning Total Credits for a Programme:

The UGC, in its notification No.F.1-1/2015 (Sec.) dated 10/4/15 has provided a set of "Model curricula and syllabi for CBCS programmes. In conformation with this notification, at Yenepoya (Deemed to be University), for UG programs with duration of 3years study period or 6 semesters, the total credits shall be a maximum of 140 credits and for the UG programme with duration of 4 years study period or 8 semesters, the total credits shall be a maximum of 170 credits.

## 16. CBCS Program Coding System

The coding system shall be in the consonance with the system followed by the office of the controller of examination. Presently the following coding pattern is followed.

**16.1.** First two letters describe the faculty name followed by level of programme (UG – 01; PG – 02) and two letters represent the programme.

**16.2.** Course code shall have prefix denoting semester number followed by an alphabet of respective type of courses such as C = Core, AECC= Ability Enhancement Compulsory, GE=Generic Elective, SE= Skill Enhancement, SL = Self -Learning, P=Practical followed by numbers denoting number of courses taught-

1st SEM: 1C1, 1C2, 1C3, 1AECC1, 1AECC2, GE1/SE1/SL1 1P1 etc.
2nd SEM: 2C1, 2C2, 2AECC1, A2ECC2, GE2/SE2/SL2, 2P1,etc.
3rd SEM: 3C1, 3C2, 3AECC1, 3AECC2, GE3/SE3/SL3, 3P1, 3P2etc.
4th SEM: 4C1, 4C2, 4C3, 4P1,4P2 , GE4/SE4/SL4etc.
5th SEM: 5C1, 5C2, 5GE1/5SE1, 5P1, 5P2, 5P3,GE5/SE5/SL5etc.
6th SEM:6C1, 6C2, 6GE1/6SE1, 6P1, 6P2, 6P, GE6/SE6/SL6etc.
7th SEM:7C1 Internship
8th SEM:8C1 Internship

## 17. Attendance:

**17.1.** Each course (theory, practical, clinical etc.) shall be treated as an independent unit for the purpose of attendance. Candidates having minimum 80% attendance in each of the Courses can only qualify to appear for the Semester End Examination. The Candidates with less than 80% of attendance shall be required to repeat that Course by attending the semester.

**17.2.** There shall be no provision for condonation of shortage of attendance.

**17.3.** For SWAYAM/MOOC/NPTEL it shall be as per the regulations governing the courses of implementing authority.

**17.4.** The HOD/Course Coordinator through the Dean of Faculties shall announce the names of the candidates who will not be eligible to take the Semester End- Examinations (SEE) in the various courses and send a copy of the same to the Controller of Examinations (COE) Office. Registrations of such candidates for those courses shall be treated as cancelled.

**18. Scheme of examination**

**18.1.** Evaluation of a course shall be done based on continuous internal assessment (CIA) mode followed by semester end university examination (SEE) for each course.

**18.2.** The components of CIA (Continuous Internal Assessment) may include 2 internal assessment tests, assignments and assessment of conduct/discipline.

**18.3.** The marks for CIA shall be 40% and SEE shall be 60%.

**18.4.** There shall be no minimum marks for CIA for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.

**18.5.** There shall be examinations at the end of each semester ordinarily during December/January for odd($1^{st}$ & $3^{rd}$) semesters and during June/July for even($2^{nd}$ & $4^{th}$) semesters.

**18.6.** The SEE duration shall be three hours.

**18.7.** The question paper pattern shall be decided by the Board of Studies (BOS) of the respective departments.

**Internal assessment format per course (distribution of marks)**

| **Internal Assessment Components** | **Maximum Marks** |
|---|---|
| Two IA tests | 20 |
| Assignment | 10 |
| Conduct/discipline | 10 |
| **Total Marks** | **40** |

First Internal Assessment shall be held in the $6^{th}$ week of the semester and the second internal examination will be held one month before the semester end university examination.

## Question Paper Pattern for Core course SEE

| | SUBJECTS HAVING MAXIMUM MARKS = 60 | | | | Duration |
|---|---|---|---|---|---|
| **Type of question** | **Number of questions** | **To be Answered** | **Marks for each question** | **Total** | 180 minutes |
| LONG ESSAY TYPE | 02 | 01 | 10 | 10 | |
| SHORT ESSAY TYPE | 10 | 08 | 05 | 40 | |
| SHORT ANSWERS | 07 | 05 | 02 | 10 | |
| | | | **Total** | **60** | |

## Question Paper Pattern for AECC SEE

| | SUBJECTS HAVING MAXIMUM MARKS = 40 | | | | Duration |
|---|---|---|---|---|---|
| **Type of question** | **Number of questions** | **To be Answered** | **Marks for each question** | **Total** | 90 minutes |
| LONG ESSAY TYPE | 02 | 01 | 10 | 10 | |
| SHORT ESSAY TYPE | 05 | 03 | 05 | 15 | |
| SHORT ANSWERS | 07 | 05 | 03 | 15 | |
| | | | **Total** | **40** | |

**Practical examination**

| SI.NO | Components | Marks |
|---|---|---|
| 1 | Spotters | 20 |
| 2 | Case scenario/Stations | 20 |
| 3 | Viva Voice | 20 |
| Total Marks | | 60 |

**PARTICULARS OF PRACTICAL, VIVA-VOCE**

- Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as a specialist.
- Viva- Voce examination shall aim at assessing depth of knowledge, logical reasoning, confidence & oral communication skills.
- OSCE/OSPE- shall have minimum of 4 stations.

**19. Evaluation of Answer Scripts**

**19.1.** Each theory examination shall have single evaluation. There shall be provision for re-evaluation on a payment of a fee. An external examiner shall value the paper, if the difference is more than 15% of previous marks the answer script shall be sent for third evaluation. In such an event, the average of the best two out of the three scores will be taken as the final score.

**19.2.** Practical examination shall be jointly conducted and evaluated by one internal examiner and one external examiner.

**20. Classification of Successful candidates:**

The results of successful candidates at the end of each semester shall be declared in terms of Grade Point Average (GPA) and Alpha-Sign Grade. The results at the end of the sixth semester shall be classified on the basis of the Cumulative Grade Point Average (CGPA) obtained in all the six semesters and the corresponding overall alpha sign grade.

## 20.1. Letter Grades and Grade Points:

**20.1.1.** The Deemed to be University would be following the absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.

**20.1.2.** The UGC recommended 10-point grading system with the following letter grades are given below:

| Letter Grade | Grade Point |
|---|---|
| O (Outstanding) | 10 |
| A+ (Excellent) | 9 |
| A (Very Good) | 8 |
| B+ (Good) | 7 |
| B (Above Average) | 6 |
| C (Average) | 5 |
| P (Pass) | 4 |
| F (Fail)/ RA (Reappear) | 0 |
| Ab (Absent) | 0 |
| Not Eligible (NC) detained | 0 |

**20.1.3.** A student obtaining Grade RA/ Ab shall be considered failed and will be required to reappear in the end semester examination.

## 20.2. The Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester.

For example, if a student takes five (Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4 + C5G5}{C1 + C2 + C3 + C4 + C5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example if a student has a F or ABS grade in program 4, the SGPA shall then be computed as:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4* ZERO + C5G5}{C1 + C2 + C3 + C4 + C5}$$

## 20.3. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VI semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VI semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the program(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$CGPA = \frac{C1S1+C2S2+C3S3+C4S4+C5S5+C6S6}{C1+C2+ C3+ C4+ C5+C6}$$

where C1, C2, C3,…. is the total number of credits for semester I,II,III,…. and S1, S2, S3….is the SGPA of semester I, II, III,…..

**Calculation of GPA & CGPA: An example (1st semester)**

| Program Code | Course | Credits (a) | Grade Obtained | Credit Value (b) | Grade Points (axb) |
|---|---|---|---|---|---|
| | Course 1 | 4 | B | 8 | 32 |
| | Course 2 | 4 | B | 8 | 32 |
| | Course 3 | 4 | O | 10 | 40 |
| | Course 4 | 2 | C | 7 | 14 |
| | Course 5 | 2 | A | 9 | 18 |
| | Total | 16 | - | - | 136 |

1st Semester GPA = Total Grade Points / Total Credits = 136 / 16 = 8.5 2nd Semester GPA = 7 with respect to 18 Credits
Then 1st Year CGPA = (8.5 x 16) + (7 x 18) / 16 + 18 = 7.7

## 21. Declaration of Class

The class shall be awarded on the basis of Cumulative marks scored in all the Courses
First Class with Distinction= Aggregate Marks 75% and above
First Class = Aggregate Marks 60 to 74.9%
Second Class = Aggregate Marks 50 to 59.9%

### 21.1. Promotion Criteria

- The students are allowed to carry over any number of courses till sixth semester. But student is eligible to appear for the End semester exam of sixth semester if he/she has cleared all the Courses both Core and AECC of first, second, third & fourth semesters. If student has any pending course of first to fourth semesters, he/she is not eligible to appear for the end semester exam of the sixth semester. However, Fifth semester courses are allowed to club with sixth semester end examination. But, all the Core courses and AECC Courses of first to fourth semester should be completed to be eligible for 6th end semester exam.

- Candidate should also complete 12 credits of elective course to be eligible for the $6^{th}$ (in case of 3year program) end Semester Examination.

- Candidate should clear all Courses (Core, AECC & Elective courses) of all the semester, to be eligible to start the one year of mandatory internship.

- A fail in any one Course will mean the candidate has to reappear for the exam in that Course only.

- A candidate who passes the semester examinations in parts is eligible for only CGPA and letter grade but not for Class/ ranking/award/medal from the University.

## 22. Internship

A candidate has to mandatorily complete 1 year (2 semesters) of internship. The total credits per semester is 18 and for two semesters it is 36.

The internship time period provides the candidate the opportunity to develop confidence and increased skill in simulation and treatment delivery. Candidate will demonstrate competence in basic and intermediate procedures and will observe the advanced and specialized treatment procedures. The candidate will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The candidate is expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

### 22.1. Eligibility

A candidate should have passed in all the courses (Core, AECC, and Electives) amounting to 122 number of credits before entering in to internship.

## 23. Eligibility for the award of Degree

A candidate shall have passed in all the Courses of all six semesters and should have successfully completed one year of mandatory internship (02 semesters) as required for the programme.

## 24. Maximum Period for Completion of Programme:

A candidate shall complete Six semesters (Three Years) programme within Six years from the date of admission. Hence, the maximum period for completion of the programme is seven years.

## 25. Minimum for a pass:

**25.1.** A candidate shall be declared to have passed the UG programme if he/she secures at least CGPA of 4.0 (Course Alpha-Sign Grade P) in the aggregate of both internal assessment and semester end examination marks.

**25.2.** The candidates who pass all the semester examinations in the first attempts in Three years are eligible for ranks provided they secure at least a CGPA of 8.0 (at least Alpha-Sign Grade A).

**25.3.** The results of the candidates who have passed the sixth semester examination but not passed the lower semester examinations shall be declared as NCL (Not Completed Lower semester examinations). Such candidates shall be eligible for the degree only after completion of all the lower semester examinations.

**25.4.** A candidate who passes the semester examinations in parts is eligible for only CGPA and Alpha-Sign Grade but not for ranking.

**25.5.** There shall be no minimum in respect of internal assessment and viva-voce marks.

**26. Re-Entry after Break of the study:**

**26.1.** Candidates admitted to a program abstaining for more than 3 months must seek readmission into the appropriate semester.

**26.2.** The candidate shall follow the syllabus in vogue (currently approved/is being followed) for the program.

**26.3.** All re-admissions of candidates are subject to the approval of the University.

**Programme Structure**

**Semester I**

| Sl. No | Category | Course Name | Max Marks | | Total Marks | Hours Per week | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | IA | SEE | | L | T | P | |
| 1 | Core | Anatomy | 40 | 60 | 100 | 4 | - | - | 4 |
| 2 | Core | Physiology | 40 | 60 | 100 | 4 | - | - | 4 |
| 3 | Core | Biochemistry | 40 | 60 | 100 | 4 | - | - | 4 |
| 4 | Core | Dialysis Therapy I | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 5 | AECC | English & Communication | 10 | 40 | 50 | 2 | - | - | 2 |
| 6 | AECC | Constitution of India | 10 | 40 | 50 | 2 | - | - | 2 |
| Total | | | | | 500 | | | | 20 |

Note: Of the total available 36 hours per week for teaching learning processes, 20 hours per week is dedicated to Core and AECC courses. Remaining Hours are available for Electives/Value added courses/Extracurricular activities etc.

**Semester II**

| Sl. No | Category | Course Name | Max Marks | | Total Marks | Hours Per week | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | IA | SEE | | L | T | P | |
| 1 | Core | General pathology | 40 | 60 | 100 | 4 | - | - | 4 |
| 2 | Core | Microbiology | 40 | 60 | 100 | 4 | - | - | 4 |
| 3 | Core | Dialysis Therapy II | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 4 | AECC | Environmental Studies | 10 | 40 | 50 | 2 | - | - | 2 |
| 5 | AECC | Health Care | 10 | 40 | 50 | 2 | | | 2 |
| 6 | AECC | Medical Ethics | 10 | 40 | 50 | 1 | - | - | 1 |
| 7 | AECC | Sociology | 10 | 40 | 50 | 1 | | | 1 |
| Total | | | | | 500 | | | | 18 |

Note: Of the total available 36 hours per week for teaching learning processes, 18 hours per week is dedicated to Core and AECC courses. Remaining Hours are available for Electives/Value added courses/Extracurricular activities etc.

**Semester III**

| Sl. No | Category | Course Name | Max Marks | | Total Marks | Hours Per week | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | IA | SEE | | L | T | P | |
| 1 | Core | Systemic Pathology | 40 | 60 | 100 | 4 | - | - | 4 |
| 2 | Core | Applied Microbiology | 40 | 60 | 100 | 4 | - | - | 4 |
| 3 | Core | General Pharmacology | 40 | 60 | 100 | 4 | - | - | 4 |
| 4 | Core | Applied Anatomy & Physiology | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 5 | Core | Renal Disease I | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 6 | Core | Clinical Dialysis I | 40 | 60 | 100 | - | - | 8 | 4 |
| 7 | AECC | Kannada | 10 | 40 | 50 | 2 | - | - | 2 |
| Total | | | | | 650 | | | | 26 |

Note: Of the total available 36 hours per week for teaching learning processes, 26 hours per week is dedicated to Core and AECC courses. Remaining Hours are available for Electives/Value added courses/Extracurricular activities etc.

**Semester IV**

| Sl. No | Category | Course Name | Max Marks | | Total Marks | Hours Per week | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | IA | SEE | | L | T | P | |
| 1 | Core | Dialysis Therapy III | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 2 | Core | Renal Disease II | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 3 | Core | Applied Pharmacology | 40 | 60 | 100 | 4 | - | - | 4 |
| 4 | Core | Renal Nutrition | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 5 | Core | Clinical Dialysis II | 40 | 60 | 100 | - | - | 8 | 4 |
| 6 | AECC | Human Rights and Gender Equity | 10 | 40 | 50 | 2 | - | - | 2 |
| 7 | AECC | Biostatistics | 10 | 40 | 50 | 2 | - | - | 2 |
| Total | | | | | 600 | | | | 24 |

Note: Of the total available 36 hours per week for teaching learning processes, 24 hours per week is dedicated to Core and AECC courses. Remaining Hours are available for Electives/Value added courses/Extracurricular activities etc.

**Semester V**

| Sl. No | Category | Course Name | Max Marks | | Total Marks | Hours Per week | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | IA | SEE | | L | T | P | |
| 1 | Core | Applied Dialysis Technology I | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 2 | Core | Applied Dialysis Technology II | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 3 | Core | Hemodialysis Guidelines | 40 | 60 | 100 | 3 | - | - | 3 |
| 4 | Core | Renal Dialysis Technology related with Laboratory, Cardiology & Imaging Technology | 40 | 60 | 100 | 3 | - | - | 3 |
| 5 | Core | Clinical Dialysis III | 40 | 60 | 100 | - | - | 8 | 4 |
| Total | | | | | 500 | | | | 18 |

Note: Of the total available 36 hours per week for teaching learning processes, 18 hours per week is dedicated to Core and AECC courses. Remaining Hours are available for Electives/Value added courses/Extracurricular activities etc.

**Semester VI**

| Sl. No | Category | Course Name | Max Marks | | Total Marks | Hours Per week | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | IA | SEE | | L | T | P | |
| 1 | Core | Advanced Dialysis Technology I | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 2 | Core | Advanced Dialysis Technology II | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 3 | Core | Renal Transplantation | 40 | 60 | 100 | 3 | 1 | - | 4 |
| 4 | Core | Clinical Dialysis IV | 40 | 60 | 100 | - | - | 8 | 4 |
| Total | | | | | 400 | | | | 16 |

Note: Of the total available 36 hours per week for teaching learning processes, 16 hours per week is dedicated to Core and AECC courses. Remaining Hours are available for Electives/Value added courses/Extracurricular activities etc.

**Semester VII**

| Sl. No | Category | Course Name | Max Marks | | Total Marks | Hours Per day | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | IA | SEE | | L | T | P | |
| 1 | Core | Internship I | 40 | 60 | 100 | - | - | 6 | 1 |
| Total | | | | | 100 | | | | 18 |

**Semester VIII**

| Sl. No | Category | Course Name | Max Marks | | Total Marks | Hours Per day | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | IA | SEE | | L | T | P | |
| 1 | Core | Internship II | 40 | 60 | 100 | - | - | 6 | 1 |
| Total | | | | | 100 | | | | 18 |

| | | |
|---|---|---|
| **Total credit** | | **122** |
| **Elective** | | **12** |
| **Internship** | | **36** |
| **Total Credit of the program** | | **170** |

# FIRST SEMESTER

# ANATOMY

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- Identify and locate each of the body systems to apply anatomical knowledge to perform minor technical procedural skills.
- Know the normal disposition of the structures in the body while clinically examining a patient and while conducting clinical procedures.
- Describe the functions of each body system.
- Discuss the interrelationship of systems in maintaining homeostasis.
- Know the anatomical basis of disease and injury.

**COURSE CONTENT:**

**Unit 1: Introduction: Human body as a whole** **2 Hours**

Definition of anatomy and its divisions. Terms of location, positions and planes. Cell and its organelles.

Epithelium: definition, classification, describe with examples, function. Glands: classification, describe serous & mucous glands with examples. Basic tissues: classification with examples

Demonstration: Histology of types of epithelium. Histology of serous, mucous & mixed salivary gland.

**Unit 2: Locomotion and support** **12 hours**

Bone: classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, inter-vertebral disc, fontanelles of fetal skull.

Joints: classification of joints with examples, synovial joint (in detail for radiology). Muscular system: classification of muscular tissue & histology, names of muscles of the body.

Demonstration: Bones & joints. Histology of compact bone (TS & LS). Demonstration of all muscles of the body. Histology of skeletal, smooth &cardiac muscle (TS & LS). Histology of the 3 types of cartilage. Demo of all bones showing parts, radiographs of normal.

**Unit 3: Cardiovascular system** **8 hours**

Heart: size, location, chambers, exterior & interior, blood supply of heart. Systemic &pulmonary circulation, branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery, peripheral pulse, inferior vena cava, portal vein, Porto-systemic anastomosis, great saphenous vein, Dural venous sinuses. Lymphatic system: cisterna chyli& thoracic duct, histology of lymphatic tissues, names of regional lymphatics, axillary and inguinal lymph nodes in brief

Demonstration of heart and vessels in the body. Histology of large artery, medium sized artery & vein, large vein. Histology of lymph node, spleen, tonsil & thymus. Normal chest radiograph showing heart shadows. Normal angiograms

**Unit 4: Gastro-intestinal system** **8 hours**

Parts of GIT, oral cavity, lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring, oesophagus, stomach, small and large intestine,liver,gall bladder, pancreas, radiographs of abdomen

Demonstration of parts of gastro intestinal system. Normal radiographs of gastro intestinal system. Histology of gastro intestinal system.

**Unit 5: Respiratory system** **4 hours**

Parts of RS, nose, nasal cavity, larynx, trachea, lungs, broncho-pulmonary segments, histology of trachea, lung and pleura, names of paranasal air sinuses.

Demonstration of parts of respiratory System Normal radiographs of chest. -Histology of lung and trachea

**Unit 6: Peritoneum** **1 hour**

Description in brief. Demonstration of reflections.

**Unit 7: Urinary system** **2 hours**

Kidney, ureter, urinary bladder, male and female urethra. Histology of kidney, ureter and urinary bladder

Demonstration of parts of urinary system. Histology of kidney, ureter, urinary bladder. Radiographs of abdomen-IVP, retrograde cystogram.

**Unit 8: Reproductive system** **2 hours**

Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology). Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology). Mammary gland: gross

Demonstration of section of male and female pelvis with organs in situ. Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tube, ovary. Radiographs of pelvis, hysterosalpingogram.

**Unit 9: Endocrine glands** **2 hours**

Endocrine glands: pituitary gland, thyroid gland, parathyroid gland, suprarenal glad (Gross & Histology).

Demonstration of the glands. Histology of pituitary, thyroid, parathyroid, suprarenal gland.

**Unit 10: Nervous system** **12 hours**

Neuron, classification of nervous system, cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology), meninges, ventricles & cerebrospinal fluid, names of basal nuclei, blood supply of brain, cranial nerves. Sympathetic trunk& names of parasympathetic ganglia

Histology of peripheral nerve & optic nerve. Demonstration of all plexuses and nerves in the body. Demonstration of all parts of brain. Histology of cerebrum, cerebellum, spinal cord.

**Unit 11: Sensory organs** **3 hours**

Skin: histology, appendages of skin. Eye: parts of eye & lacrimal apparatus. Extra-ocular muscles & nerve supply. Parts of ear: external, middle and inner ear and contents.

Histology of thin and thick skin. Demonstration and histology of eyeball. Histology of cornea & retina.

**Unit 12: Embryology** **4 hours**

Spermatogenesis & oogenesis. Ovulation, fertilization. Fetal circulation. Placenta, Demonstration of models.

**Course Outcome:**

- Demonstrate the structure of various organs in the human body and correlate the structure with the functions to know how both structure and function are modified by disease.
- Identify and locate all the structures of the body.
- Identify the microscopic structures of various tissues and organs in the human body and correlate the structure with the functions for understanding the altered state in various disease processes.
- Understand the basic principles of embryology including major variations, abnormalities and the congenital anomalies involved in development of the organs and systems.

**Recommended Books**


(1) Chaurasia BD. BD Chaurasia's Human Anatomy. CBS Publishers & Distributors PVt Ltd.; 2010.

(2) Manipal Manual of Anatomy for Allied Health Sciences ,Dr Sampath Madhyastha

(3) Waugh A, Grant A. Ross & Wilson Anatomy and physiology in health and illness E-book. Elsevier Health Sciences; 2014 Jun 25.

(4) Dilly PN. Essentials of Human Embryology. Postgraduate Medical Journal. 1984 Jun;60(704):447.

(5) Inderbir S. Textbook of human histology with color atlas. New Delhi: Jaypee Brithers Medical Publishers. 2006.

# PHYSIOLOGY

## Course: Core Number of Hours:60

## Credits: 4

**Course objectives:**

- To broadly understand the physiological structure of each organ system and its physiological functions.
- To understand broadly the clinical abnormalities of organs and its clinical physiological implications.

**Syllabus**

**Unit 1: General Physiology** **2 hours**

Introduction to physiology.

Homeostasis: Definition, Positive feedback, negative feedback.

Body Fluid Compartments Transport mechanisms (brief).

**Unit 2: Blood** **7 hours**

Introduction: composition and function of blood.

Blood Cells: types, Normal Count, Red blood cells: function. Erythropoiesis: Definition, Stages, Factors affecting, Hemoglobin: Function, concentration Physiological variation of RBC Count and Hb Structure of Hb, methods of estimation.

White blood cells: different types, functions, normal count, differential count Immunity(brief)

Platelets: origin, normal count, functions Morphology.

Haemostasis: definition, steps, clotting factors, mechanism of clotting, disorders of clotting, Blood groups: ABO system, Rh system: Rh factor, Rh incompatibility. Blood grouping & typing, cross matching. Blood transfusion: indication, universal donor and recipient concept. Selection criteria of a blood donor, transfusion reactions. Anticoagulants: classification, examples and uses.

Anemias: definition, Symptoms and signs (brief). Blood indices: color index, MCH, MCV, MCHC (def and Normal Values). ESR and PCV: normal values, definition, determination (methods).

Morphological and etiological classification of Anemia Plasma proteins: types and concentration, functions of albumin, globulin, fibrinogen, prothrombin. Blood volume: normal value, determination of blood volume Regulation of blood volume (brief), Functions of Lymph.

**Unit 3: Muscle Nerve physiology** **5 hours**

Introduction, Classification and structure of muscle, sarcomere contractile proteins.

Neuromuscular junction, Transmission across neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction, rigor mortis. Fatigue.

**Unit 4: Cardiovascular system** **8 hours**

Heart: physiological anatomy, nerve supply. Properties of cardiac muscle Cardiac cycle: definition, systole, diastole, phases, JVP (brief) Cardiac output, stroke volume, EDV (only definitions). Heart sounds, normal heart sounds, mechanism and features, areas of auscultation.

Intra-ventricular pressure curves, Significance of Heart sounds.

Blood pressure: definition, normal value, clinical measurement of blood pressure, hypotension, hypertension Heart rate: Physiological variations, regulation (brief), radial pulse, Electrocardiogram (ECG): Definition, Normal ECG, Causes of ECG waves, Uses of ECG. Cardiac shock: Definition, Types (brief), Triple response.

**Unit 5: Respiratory system** **6 hours**

Introduction: Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract Respiratory organs: lungs, alveoli, respiratory membrane Mechanism of breathing: Inspiration and Expiration, muscles involved, Mechanism.

Surfactant: Composition, Function, intra pulmonary pleural pressure, surface tension.

Transport of oxygen: forms of transport, Oxygen Hemoglobin Curve. Lung volumes and capacities: Spirogram, Definitions and normal Volumes. Regulation of respiration: Nervous and chemical regulation, respiratory Centre, Herring Bruere flexes. Hypoxia: Definition, Classification, Description (in brief). Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnea. (Definition Only).

**Unit 6: Digestive System** **5 hours**

Introduction Physiological anatomy of gastro intestinal tract (All Structures in brief), functions of digestive system. Functions of Saliva Deglutition: definition, stages.

Stomach: functions Gastric secretion: composition, function, Phases of secretion Pancreas: Functions (exocrine), pancreatic juice: composition and regulation. Secretin and CCK-PZ.

Liver: Functions, Bile secretion, composition, function of bile; Bilirubin metabolism, types of bilirubin, Vandenberg reaction, Jaundice: types, significance. Gall bladder: Functions.

Small intestine: functions, digestion and absorption, movements. (brief)Large intestine: functions, defecation reflex.

**Unit 7: Renal System** **5 hours**

Introduction: Functions of kidneys, composition of urine, nephron, cortical and juxtamedullary nephrons (comparison), Juxta Glomerular Apparatus: structure and function. Vasa recta.

Mechanism of urine formation GFR: Definition, Normal Values, factors effecting GFR, Measurement (Creatine, Inulin Clearance). Tubular reabsorption, TMG, Tubular secretion (brief).

Mechanism of urine concentration: Counter-current mechanisms, Role of ADH Diuresis, Diuretics. Micturition, innervation of bladder, cystometrogram.

**Unit 8: Skin and Body temperature** **1 hour**

Structure and function of Skin Sweat Glands Body Temperature: physiological variation. Regulatory mechanisms: Mechanisms Activated by Heat/Cold Role of hypothalamus, and fever.

Body temperature measurement, hypothermia.

**Unit 9: Endocrine System** **5 hours**

Introduction: Definition, classification of endocrine glands & their hormones.

Hypothalamic- pituitary Axis Pituitary hormones: anterior and posterior pituitary hormones, Functions of Growth hormone.

Thyroid gland: Thyroid Hormones: physiological function, regulation of secretion, disorders: hypo and hyper secretion of hormone. Physiological anatomy of Thyroid.

Adrenal cortex: functions of Cortisol and Aldosterone Adrenal medulla: functions of Adrenaline and Noradrenaline. Physiological anatomy of Adrenal.

Pancreas (Endocrine): Hormones of pancreas. Insulin: functions, regulation of blood glucose level, Diabetes mellitus Abnormalities of pancreatic hormones(brief)Regulation of Calcium Metabolism: Hormones involved, actions of PTH, Calcitonin, Vit D3Tetany.

**Unit 10: Reproductive system** **4 hours**

Introduction, Function of reproductive system, Changes during puberty.

Sex Differentiation.

Male reproductive system: functions of testes Spermatogenesis: Definition, site, stages, factors influencing, Endocrine functions of testes Sperm, semen. Androgens: testosterone functions.

Female reproductive system, Menstrual cycle: Definition, changes, ovulation Functions of progesterone and estrogen Hormonal Regulation Physiological changes during pregnancy, Lactation(brief), milk ejection reflex.

**Unit 11: Nervous system** **8 hours**

Introduction: Parts of CNS and PNS, Functions of nervous system.

Neuron: definition, structure Nerve Fiber: classification, conduction of impulses continuous and saltatory. Neuroglia.

Synapse: Definition, structure, types, properties (brief). Receptors: definition, classification, properties (brief). Reflex: Definition, Reflex Arc, Examples.

Babinski’s sign. Tone, Posture(definition), Spinal cord nerve tracts: Diagram and Functions: Lateral Spino Thalamic Tract, Dorsal Column, Pyramidal Tract. UMN and LMN lesion, Hemiplegia, Stroke (brief)Functions of: Cerebral cortex, Cerebellum, Hypothalamus, Basal Ganglia EEG, Parkinsonism.

Cerebro Spinal Fluid (CSF): site of formation, circulation (brief), functions. Lumbar puncture. Autonomic Nervous System: Sympathetic and parasympathetic distribution and functions (brief).

**Unit 12: Special senses** **4 hours**

Vision: Functions of different parts(brief)Optic Pathway, Dark Adaptation, Color vision. Structure of eye, Structure of retina.

Hearing: Function of Middle Ear, Functions of inner ear, mechanism of hearing (brief).

Chemical Senses: Taste: types, receptor, Smell: physiology, receptors.

**Course Outcomes:**

- Can able to broadly understand the physiological structure of each organ system and its physiological functions.
- Can able to understand broadly the clinical abnormalities of organs and its clinical physiological implications.

**Recommended Books**


1. Guyton (Arthur): Text Book of Physiology. Latest Ed. Prism publishers.
2. Ganong William F: Review of Medical Physiology. Latest Ed. Tata McGraw Hill
3. Chatterjee CC: Human Physiology Latest Ed. Vol-1, Medical Allied Agency. Choudhary Sujith K: Concise Medical Physiology Latest Ed. New Central Book.

# BIOCHEMISTRY

## Course: Core No. of Hours: 60

## Credits: 4

## Course Objectives:

- Understanding the basic principles and procedures in specimen collection, reagent preparation and testing in Clinical laboratory.
- Understanding the properties of biomolecules, their function and biochemical process involved in health and disease.
- Understanding the importance of nutrition in health and disease.

**Course Content:**

**Unit 1: Introduction and scope of Biochemistry** **2 hours**

**Unit 2: Specimen collection:** **4 hours**

Pre-analytical variables. Collection of blood. Collection of CSF & other fluids. Urine collection. Use of preservatives. Anticoagulants.

**Unit 3: Safety measurements, Conventional and SI units** **2 hours**

**Unit 4: Dilutions** **2 hours**

Diluting solutions: e.g. preparation of 0.1 N NaCl from 1 N NaCl& from 2NNaCl etc., preparing working standard from stock standard, body fluid dilutions, reagent dilution techniques, calculating the dilution of a solution, body fluid reagent etc., saturated and supersaturated solutions.

**Unit 5: Carbohydrate chemistry** **4 hours**

Classification, Isomerism, General reactions of carbohydrates.

**Unit 6: Lipids** **4 hours**

Chemistry of fatty acids, triglycerides, cholesterol, phospholipids, lipoproteins, Classification and functions.

**Unit 6: Protein chemistry, structure** **4 hours**

**Unit 7: Plasma Proteins** **2 hours**

Concentration, biochemical changes in disease, interpretation.

**Unit 8: Enzymes** **6 hours**

Definition, classification, coenzymes, cofactors, factors effecting enzyme activity, inhibitors, units of measurements, isoenzymes, biological interpretation.

**Unit 9: Vitamins** **6 hours**

Definition, classification, sources, functions, deficiency disorders.

**Unit 10: Minerals** **6 hours**

Na, K, Ca, P, Fe, Cu, selenium- sources, daily requirements, availability and properties.

**Unit 11: Nutrition** **3 hours**

Calorific value, nitrogen balance, respiratory quotient, basal metabolic rate, dietary fibers, nutritional importance of lipids, carbohydrates and proteins, vitamins. nutrition, nutritional support with special emphasis on parental nutrition.

**Unit 12: Quality control** **2 hours**

Accuracy, precision. Specificity, sensitivity, limits of error allowable in laboratory, percentage error. Normal values and Interpretations.

**Unit 13: Special Investigations** **11 hours**

Serum electrophoresis, immunoglobulins, drugs: digitoxin, theophylline's, regulation of acid base status, Henderson Hassel Bach equations, buffers of the fluid, pH regulation, disturbance in acid base balance, anion gap, metabolic acidosis, metabolic alkalosis, respiratory acidosis, respiratory alkalosis, basic principles and estimation of blood gases and pH, basic principles and estimation of electrolytes, water balance, sodium regulation, bicarbonate buffers.

**Unit 14: Bio Medical waste management** **2 hours**

**Course Outcomes:**

At the end of the course students must demonstrate an understanding of

- Various biomolecules in our body and their classification.
- Sample collection for various tests performed in laboratory.

- Preparation of dilutions of chemicals and body fluids.
- Various terms used in quality control.
- Biomedical wastes management.
- Significance of various special investigations.

**Recommended Books:**


1. Varley H. Practical clinical biochemistry. Practical clinical biochemistry.. 1954.
2. Naithani M, Singh P. Teitz textbook of clinical chemistry & molecular diagnostics.
3. Medical Journal, Armed Forces India. 2006 Apr;62(2):204.
4. Kaplan LA, Pesce AJ, Kazmierczak SC. Clinical chemistry. Theory, analysis, correlation. 2003.
5. Ramakrishna(S) Prasanna(KG), Rajna ® Text book of Medical Biochemistry Latest Ed Orient Longman Bombay –1980
6. Vasudevan (DM) Sreekumari(S) Text book of Biochemistry for Medical students ,Latest Ed
7. Das(Debajyothi) Biochemistry Latest ED Academic, Publishers, Culcutta – 1992
8. Rajagopal G & Ramakrishna - 1983 Practical Biochemistry for Medical Students Oriental Blackswan Pvt. Ltd.
9. Burtis CA and Ashwood ER, Tietz Fundamentals of Clinical chemistry, Harcort (India) Ltd, 7 th Ed, 20154.

# Dialysis Therapy I

## Corse: Core Number of Hours: 60

## Credits: 4

## Course Objectives:

- Understand the principles of dialysis.
- Comprehend the indications of Hemodialysis & Peritoneal Dialysis.
- Understand the functioning and management of Hemodialysis apparatus.

## Course Contents:

**Unit 1: Introduction to dialysis** **20 hours**

1.1. History of Dialysis

1.2. Types of Dialysis

1.3. Principle of Dialysis

1.4. The nature of the solutions

1.5. Semi permeable membrane

1.6. Types of solute transport & factors affecting solute transport

**Unit 2: Hemodialysis Part 1** **15 hours**

1.1. Introduction

1.2. Types of Hemodialysis

1.3. Indications, contraindications, advantages and disadvantages

**Unit 3: Peritoneal dialysis Part 1** **15 hours**

3.1. Introduction

3.2. Peritoneum

3.3. Peritoneal Dialysis Procedure, Indications, contraindications, advantages and disadvantages

**Unit 4: Haemodialysis apparatus** **10 hours**

4.1. Dialyser

4.2. Dialysate

**Course Outcomes:**

- Describe the principles of hemodialysis and peritoneal dialysis.
- Describe the indications of hemodialysis and peritoneal dialysis.
- Explain the functioning and management of hemodialysis apparatus.

**Recommended Books:**

1. Hand book of dialysis therapy- Allen R. Nissenson & Richard N. Fine- 4th edition- Saunders , Elsevier
2. Oxford handbook of dialysis-2nd edition-Jeremy Levy,Julie Morgan, Edwina Brown
3. Dialysis therapy 3rd edition- Nissenson. Fine Review of Hemodialysis for Nurses and Dialysis Personnel – by Judith Z Kallenbach

# ENGLISH AND COMMUNICATION

**Course: AECC** **Number of Hours: 30**

**Credits: 2**

## Course Objectives

The course is designed to enable students to enhance their ability to speak and write English required for effective communication in their professional work. Students will practise their skills in verbal and written English during clinical and classroom experience.

## Course Contents:

**Unit 1: Phonetics** **4 Hours**

- Brief introduction to the history of English Language & Phonetics
- Vowels, Diphthongs, Consonants
- Native pronunciation of English words

**Unit 2: Difference between American & British English** **2 Hours**

- Difference with regards to the Vocabulary, Accent, Grammar & Spellings.
- Syllables & Word Stress

**Unit 3: Grammatical Skills** **10 Hours**

- Verb Tenses
- Appropriate Use of Prepositions
- Articles
- Subject Verb Agreement
- Appropriate usage of Punctuation and Capitalization
- Modals
- Transformation of Sentence structures
- Active Passive Voice
- Reporting skills
- Question Tags
- Homonyms & Homophones

- Degrees of Comparison
- One-word Substitution
- Linkers

**Unit 4: Written Communication Skills** **5 Hours**

- Drafting of formal letters
- Email drafts – Do's and don'ts in professional emails.
- Article and Essay writing
- Notice writing
- Speech writing
- News Report writing
- Dialogue writing

**Unit 5: Oral Communication Skills** **6 Hours**

- Way of Communicating when we meet people.
- Face to Face Communication
- Tone of voice
- Body Language
- Small Talk
- Elevator Speech
- Etiquettes of Phone Conversation & Phone role play
- Basics of meeting online
- Video conference role play
- Group discussion
- First Impressions
- Interview Skills: Purpose of an Interview
- Do's & Don'ts of an Interview

**Unit 6: Presentation Skills** **3 Hours**

- Debating
- Speech Relay
- Presentations

**Course Outcomes**

On completion of the course, the students will be able to

- Apply the concepts and principles of English Language use in professional development such as pronunciation, vocabulary, grammar, paraphrasing, voice modulation, Spelling, pause and silence.
- Apply LSRW (Listening, Speaking, Reading and Writing) Skill in combination to learn, teach, educate and share information, ideas and results.

**Recommended Books:**


1. Raymond Murphy. English Grammar in Use. Cambridge University. 2012.
2. David Green. Contemporary English Grammar Structures and Composition. Macmillan Publishers. 2015.

# CONSTITUTION OF INDIA

**Course: AECC** **Number of Hours: 30**

**Credits: 2**

## Course Objectives:

- State and explain the constitution of India and its Constituent Assembly.
- Explain fundamental rights and duties of citizen.
- Identify union, state and federalism of India.
- Knowledge of electoral process in India.
- State the basic concepts of Human Rights and its functions and authorities in society.

**Course Content:**

**Unit 1: Indian Constitution** **5 hours**

- Meaning and Importance of Constitution
- The Constituent Assembly
- The Preamble
- Salient Features of Constitution

**Unit 2: Fundamental Rights and Directive Principles** **3 hours**

- Meaning and Differences between Fundamental Rights and Directive Principles
- Fundamental Rights
- Rights Information Act Meaning, importance of RTI 2005

**Unit 3: Union Government** **4 hours**

- President of India- Election, Powers and Position
- Prime Minister and council of Ministers
- Parliament – Lok Sabha, Rajya Sabha- Organizations and Powers

**Unit 4: State Government** **4 hours**

- The Governor

- Chief Minister and Council of Ministers
- State Legislature Vidhana Sabha, Vidhana Parishad – organization and Powers

**Unit 5: Federalism In India** **2 hours**

- Meaning Federal and Unitary Features

**Unit 6: The Judiciary** **2 hours**

- The supreme Court – Organization, Jurisdiction and Role
- The High Court – Organization Jurisdiction and Role

**Unit 7: Electoral Process In India** **2 hours**

- Election Commission – Organization, Functions

**Unit 8: Local Governments** **2 hours**

- Rural and Urban – Organization, Powers and Functions

**Unit 9: Human Rights** **3 hours**

- Human rights – Meaning
- Universal Declaration of Human Rights
- Remedies against Violation of Human Rights in India

**Unit 10: Special constitutional provisions** **3 hours**

- Special Rights created in the constitution for: Dalits, Backwards, women and Children and the Religious and Linguistic Minorities.
- Constitution and Sustainable Development in India.
- Minority Commission in India.

**Course Outcome:**

- This course is to keep the students abreast with the knowledge of the Constitution of India.
- To make the students understand the importance of human rights as citizens of India.

**Recommended Books**


1. Basu, D.D , Constitution of India, New Delhi Himalaya Publication ; 2001
2. Dinesh Shelton, David P Stuart, International Human Rights in Nutshell. Thomas Burgenthel, West Nutshell Publisher; London ; 2005.
3. Parvathy Appaiah, Constitution of India, Mangalore Divya Deepa Publication ; 2005
4. Parvathy Appaiah, Human Rights. Divya Deepa Publication Mangalore; 2016
5. Raj Ram. M, Constitution of India Himalaya Publication, New Delhi; 1999

## SECOND SEMESTER

## GENERAL PATHOLOGY

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course Objectives:

- To be able to define the medical terms, define and classify disease and understand the concepts of the disease.
- Able to describe the causes and mechanism of common diseases that occur during the routine work and also changes seen in different individuals and various organs and fluids.
- Able to enumerate the laboratory tests eg: urine, blood, body fluids and its application on various diseases.

## Course Contents:

**Unit 1: Introduction** **8 Hours**

**Unit 2: Cellular Responses to Stress and Injury** **12 Hours**

- Types of cellular responses to injury
- Cellular adaptations
- In brief cell injury and types of cell injury, intracellular accumulation
- Necrosis and apoptosis (brief)
- Pathologic calcification, hyaline change, pigments

**Unit 3: Acute Inflammation** **12 Hours**

- Definition, cardinal signs and sequence of events in acute inflammation
- List chemical mediators of inflammation, outcomes of acute inflammation, morphological types/patterns of acute inflammation and briefly systemic effects of inflammation
- In brief cutaneous wound healing (primary and secondary) Factors that influence wound healing, complications of wound healing
- Types of chronic inflammation, Granulomatous diseases, briefly about tuberculosis, leprosy and syphilis

**Unit 4: Hemodynamic Disorders, Thromboembolism and Shock** **6 Hours**

- Edema and thrombosis
- Embolism, infarction and shock (in brief)

**Unit 5: Diseases of the Immune System** **8 Hours**

- Introduction to immune system
- Hypersensitivity reactions (brief)
- Autoimmune diseases and systemic lupus erythematosus (in brief)
- Acquired immunodeficiency syndrome

**Unit 6: Neoplasia** **8 Hours**

- Nomenclature of neoplasms and characteristics of benign and malignant neoplasms
- Metastasis and spread of tumors
- Etiology of cancer (carcinogenic agents)
- Laboratory diagnosis of cancer, staging grading and prognosis

**Unit 7: Genetic Disorders** **2 Hours**

- Introduction of genetic disease and classification of genetic disorders

**Unit 8: Nutritional Disorders** **4 Hours**

- Common vitamin deficiencies -Fat-soluble vitamins
- Water-soluble vitamins—vitamin B complex

## Course Outcome:

At the end of the course, the students will be able to

- Understand how body reacts to cellular responses and injuries.
- Have a basic knowledge about various laboratory tests and its application on various disorders.
- Define the medical terms, define and classify disease and understand the concepts of the disease.

**Recommended Books:**


1. Nayak R, Rai S, Gupta A. Essentials in hematology and clinical pathology. New Delhi: Jaypee Brothers Medical Publishers; 2012.
2. Mohan H. Textbook of pathology. 8th ed. New Delhi, India: Jaypee Brothers Medical; 2018.

# MICROBIOLOGY

## Course: Core No of Hours: 60

## Credits: 4

## Course Objectives:

- To become familiar with the foundation concepts of history of Microbiology & General Bacteriology.
- To understand the key concepts in Immunology.
- To gain the knowledge of common bacterial infections.
- To understand and implement biomedical waste management and tackle infections.

**Course Contents:**

**Unit 1: General Bacteriology 8 hours**

Introduction & History of Microbiology, Classification & Morphology of Bacteria, Growth & Nutrition, Culture Media & Methods, Sterilization & Disinfection, Fundamental aspects of antibacterial agents and antimicrobial susceptibility testing.

**Unit 2: Immunology 11 hours**

Infection, Immunity, Immunization schedule, applications of antigen antibody reactions, Hypersensitivity, Tumor & Transplantation Immunology.

**UNIT 3: Systematic Bacteriology 13 hours**

Common bacterial infections, Mycobacteria, Spirochaetes

**UNIT 4: Virology 10 hours**

Introduction to virology, viral hepatitis, poliomyelitis, Rabies, Human immunodeficiency virus.

**UNIT 5: Mycology & Parasitology 12 hours**

Introduction to mycology, pathogenic yeasts & fungi, Introduction to parasitology, Amoebiasis, Malaria, Helminthic infections.

**UNIT 6: Applied Microbiology** **6 hours**

Hospital acquired infections, Biomedical waste management.

## Course Outcomes:

At the end of the course, the students will be able to

- Understand how the bacteria grow and how sterilization & disinfection works.
- Have a basic knowledge about Immunization schedules and bacterial infections.
- Define terms in virology, mycology and parasitology.

## Recommended Books:


1. Baveja C. Textbook of microbiology. 1st ed. New Delhi: Arya Publications; 2005.
2. Textbook of Medical Laboratory technology, RamnikSood, 4th edition, Jaypee Publications.
3. Allied Health Sciences Laboratory Technology

# DIALYSIS THERAPY II

## Course: Core Number of Hours: 60

## Credits: 4

## Course Objectives:

- Understand the hemodialysis unit design.
- Improve skills in vital signs, BLS and water treatment plant.
- Understand the mechanism of functioning and management of hemodialysis machines.

**Course Contents:**

**Unit 1: Introduction to HD unit and Patient approach 10 hours**

- Hemodialysis unit design
- Dialysis Team
- Job responsibility

**Unit 2: Blood 10 hours**

- Blood components
- Blood typing
- Anemia
- Blood transfusion
- Blood coagulation
- Factors necessary for coagulation
- Process of coagulation

**Unit 3: Vital signs 5 hours**

- Normal values
- Methods of measurement
- Hypotension, hypertension & stages, tachycardia, bradycardia, breathlessness & fever

**Unit 4: Basic life support 5 hours**

**Unit 5: Dialysis machines: mechanism of functioning and management 5 hours**

- Haemodialysis machine

- Types
- Hemodialysis machine alarms and switches
- Blood circuit alarms
- Dialysate circuit alarms
- Causes for alarms
- Machine settings to avoid frequent false alarms
- Peritoneal dialysis machine

**Unit 6: Priming of dialysis apparatus** **5 hours**

**Unit 7: Dialysate chemistry and composition** **5 hours**

**Unit 8: Water treatment plant** **5 hours**

**Unit 9: Hemodialysis Part 2** **5 hours**

- Principles of hemodialysis
- Factors affecting solute clearance on hemodialysis
- Vascular access for hemodialysis

**Unit 10: Peritoneal dialysis Part 2** **5 hours**

- Principles
- Types and regimens

**Course Outcomes:**

- Describe the hemodialysis unit design.
- Demonstrate BLS, methods of measurement of vital signs and maintenance of water treatment plant.
- Explain the mechanism of functioning and management of hemodialysis machines.

**Text book/ Recommended Books:**


1. Best clinical practice Guidelines for chronic kidney disease in India
2. Hand book of Nephrology-Irfan K. Moinuddin, David J Leehey
3. Replacement of Renal Function by Dialysis – Edited by J.F Maher

4. Renal Nursing – by Nicola Thomas
5. Principles and Practice of Dialysis – by William L Henrich, MD
6. Review of Hemodialysis for Nurses and Dialysis Personnel – by Judith Z Kallenbach

# ENVIRONMENAL STUDIES

## Course: AECC Number of Hours: 30

## Credits: 2

## Course Objectives:

- Students will be able to learn about environment, factors affecting it, environmental ethics and its protection.
- Students will be able to Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Students will be able to Critically analyze technical subject matter (written or oral) for scientific merit apply learned environmental knowledge and understanding to solve technical /research problems in new contexts.

## Course Content:

**Unit 1: Multidisciplinary nature of Environmental Studies 1 hour**

- Multidisciplinary nature of Environmental Studies
- Concept of sustainability and sustainable development

**Unit 2: Ecosystems 4 hours**

- What is an ecosystem? Structure and function of an ecosystem; Energy flow in the ecosystem; Food chains, food webs and ecological succession. Case studies of the following ecosystems:
- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
- History of ecosystem ecology
- Ecosystem services

**Unit 3: Natural Resources 5 hours**

Renewable and Non-renewable resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

**Unit 4: Biodiversity and its conservation** **6 hours**

- Levels of biological diversity: genetic, species and ecosystem diversity; Bio geographic zones of India; Biodiversity patterns and global biodiversity hotspots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: ecological, economic, social, ethical, aesthetic and informational value.
- Nature Reserves, tribal populations and rights, Human wildlife conflicts in Indian context

**Unit 5: Environmental Pollution** **6 hours**

- Definition
- Cause, effects and control measures of: -
- Air pollution
- Water pollution
- Soil pollution
- Light pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards
- Climate change, Greenhouse effect, Global warming, Acid rain, Ozone layer depletion.
- Solid waste Management: control measures of urban and industrial wastes.
- Pollution case studies.

**Unit 6 Environmental Policies & Practices** **3 hours**

- Environmental Laws: Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- International Agreements: Montreal protocol, Kyoto protocol, Convention on Biological Diversity (CBD)
- Environmental Impact Assessment
- Carbon footprint
- Sustainable Development Goals

**Unit 7: Human communities and the environment** **3 hours**

- Human Population growth – impacts on environment
- Resettlement and rehabilitation of project affected persons: case studies
- Disaster management – floods, earthquake, cyclone and landslides
- Environmental movements: Chipko, Silent Valley, Bishnois of Rajasthan
- Environmental ethics
- Consumerism and Environment
- Environmental communication and public awareness, case studies.

**Unit 8: Field work** 2 **hours**

- Visit to a local area to document environmental assets river/ forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

**Course Outcomes:**

- Students learn to knowledge on Echo systems, biodiversity and environmental policies and practices.

**Recommended Books:**


1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
3. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
4. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
5. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
6. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
7. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
8. Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.

# HEALTH CARE

**Course: AECC** **Number of Hours: 30**

**Credits: 2**

## COURSE CONTENT

**Unit 1: Introduction to Health:** **2 Hours**

- Definition of Health, determinants of Health, Health Indicators of India, Health Team Concept. National Health Policy.
- National Health Programmes (Briefly Objectives and scope) Population of India and Family welfare programme in India.

**Unit 2: Introduction to Nursing:** **3 Hours**

- What is Nursing? Nursing principles. Inter- Personnel relationships.

**Unit 3: Bandaging**: **5 Hours**

- Basic turns; Bandaging extremities; Triangular Bandages and their application. Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.

**Unit 4: Lifting And Transporting Patients:** **5 Hours**

- Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.

**Unit 5: Bed Side Management:** **5 Hours**

- Giving and taking Bed pan, Urinal: Observation of stools, urine. Observation of sputum, understand use and care of catheters, enema giving.

**Unit 6: Methods of Giving Nourishment:** **3 Hours**

- Feeding, Tube feeding, drips, transfusion Care of Rubber Goods

**Unit 7: Vital Parameter Recording:** **2 Hours**

- Recording of body temperature, respiration and pulse,

**Unit 8: Asepsis:** **3 Hours**

- Simple aseptic technique, sterilization and disinfection. Surgical Dressing: Observation of dressing procedures

**Unit 9: First Aid** **2 Hours**

**Recommended Books:**

1. Hari S. Essentials of Management for Healthcare Professionals. Productivity Press; 2017 Dec 15.

# MEDICAL ETHICS

## Course: AECC Number of Hours: 15

## Credits: 1

## Course Objectives:

- To understand the about the ethical importance in medicine.
- Knowledge regarding ethical concepts and teaching/learning experience.
- Understand the importance of informed consent and ethical issues in health care.

**COURSE CONTENT**

**Introduction**

Medical ethics is a systematic effort to work with in the ethos of medicine, which has traditionally been service to sick.

**Unit 1: Introduction to medical ethics** **2 Hours**

What is ethics, what are values and norms, freedom and personal responsibility?

**Unit 2: Definition of medical ethics** **2 Hours**

Major principles of medic ethics.

**Unit 3: Perspective of medical ethics** **2 Hours**

The Hippocratic oath, The Declaration of Helsinki, The WHO Declaration of Geneva, International code of Medical Ethics (1993), Medical Council of India Code of Ethics (2002).

**Unit 4: Ethics of the individual** **2 Hours**

Truth and confidentiality, the concept of disease, health and healing, the Right to health.

**Unit 5: The ethics of human life** **2 Hours**

Prenatal sex determination.

**Unit 6: The family and society in medical ethics** **2 Hours**

Euthanasia, cancer and terminal care.

**Unit 7: Death and dying** **2 Hours**

Use of life-support systems, the right to die with dignity, suicide–the Ethical outlook.

**Unit 8: Professional Ethics** **2 Hours**

Contract and confidentiality, malpractice and negligence.

**Course Outcomes:**

- Increasing the awareness and knowledge of students of the value dimensions of interactions with the patients, colleagues, relations and public.
- Fostering the development of skills of analysis, decision making and judgment.
- Making the students aware of the need to respect the rights of the patient.
- Duties and responsibilities of the technologists.

**Recommended Books:**

1. Tsai DF. The WMA medical ethics manual. Journal of Medical Ethics. 2006 Mar 1;32(3):163.

# SOCIOLOGY

## Course: AECC Number of Hours: 15

## Credits: 1

## Course Objectives:

- To develop the abilities of students to analyse the sociological concepts and their
- relationship with social work practice.
- To understand Indian social problems and its impact on social development.
- To develop skills for social analysis.
- To develop an understanding of emerging issues of social concern and their impact on
- society.
- To develop basic understanding of health perspectives and their practice in social work.

**Course Contents:**

**Unit 1: Introduction to Sociology 3 hours**

- Meaning, definitions and scope of sociology.
- Importance of its study with special reference to health care professionals.
- Methods of Sociological investigations - Case study, social survey, questionnaire, interview and opinion poll methods.

**Unit 2: Society, Family, Community and Socialization 4 hours**

- Concept of society: Definition and characteristics.
- The family: Meaning, definitions and functions of family.
- Role of family on individual's health and nutrition,
- Meaning, definitions and types of communities: Rural, Urban and Tribal community
- Socialization: Meaning and characteristics, Process of socialization, Agencies of socialization and their role –Family, School, peer group, religion, media.

**Unit 3: Social Problems, Social Change, Social Planning, Social Work and Social security measures 5 hours**

- Social Problems: Meaning, characteristics and their influence on health.
- Social Change**:** Meaning, definitions and characteristics.

- Social Planning: The role of social planning in the improvement of health and rehabilitation
- Social Work -Basic concepts of social work, definitions, objectives, values and basic methods. Role of social worker in health settings.
- Social Security: Social Security schemes for the disadvantaged sections in the society.

**Unit 4: Socio-cultural factors in Health and Disease** **3 hours**

- Health: Concept, definitions and dimensions.
- Meaning of social factors and role of social factors in health and disease.
- Culture and its influence on health and disease.

**Recommended Books:**


1. Vidya Bhushan, D R Sachdeva, An Introduction to Sociology, Kitabmahal- Allahabad
2. Roshni Jain, An Introduction to Sociology, AITBS publishers - New Delhi, First edition., 2012
3. Krishna Gowda, Sociology for Nurses, CBS Publishers & amp; Distributors Pvt Ltd- New Delhi, Sixth edition., 2010
4. Ram Ahuja, Social problems in India, Prem Rawat for Rawat Publication, third edition., 2014
5. Mohammed Akram, Sociology of Health, PremRawat for Rawat Publication-Jaipur, 2014

## THIRD SEMESTER

## SYSTEMIC PATHOLOGY

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- To be able to define the medical terms, define and classify disease and understand the concepts of the disease.
- Able to describe the causes and mechanism of kidney diseases that occur during the routine work and also changes seen in different individuals.
- Able to enumerate the laboratory tests eg: urine, blood, body fluids and its application on renal diseases.

## Course Content

**Unit 1: Approach to patient with renal failure** **10 hours**

- Patient history
- Physical assessment of the renal system
- Urine analysis
- Blood analysis
- Clearance tests
- Ultrasound studies
- Radionuclide tests
- Computerized axial tomography (CAT)
- Angiogram
- Roentgenogram of kidney, uterus and bladder
- Phyelography

**Unit 2: Kidney Disease** **20 hours**

- Nephrotic syndrome
- Nephritic syndrome

- Asymptomatic urinary abnormalities
- Tumors of kidney
- Obstructive uropathies
- Nephrolithiasis
- Extracorporeal shock wave lithotripsy (ESWL)
- Congenital and inherited renal disorders
- Acute kidney injury
- Chronic kidney disease

**Unit 3: Manifestations of renal failure** **30 hours**

- Systemic consequence of renal failure Alterations in following including signs, symptoms etiology & management.
- Uremia
- Fluid balance
- Electrolyte and ion balance (sodium, potassium, calcium, phosphate, Magnesium, hydrogen, bicarbonate, aluminum)
- Acid – base balance (Metabolic acidosis)
- Cardiovascular system (Hyperkalemia, Hypertension, Pericarditis, Pericardial effusion, Pericardial tamponade)
- Respiratory system
- Gastrointestinal system
- Hematological system (Anemia, Platelet dysfunction)
- Endocrine function
- Neuromuscular function & sleep problems
- Skeletal system
- Psycho-social function
- Dermatological manifestation
- Renal problem in pregnancy
- Renal biopsy
- Congenital abnormalities of urinary system
- Acid-Base fluid and electrolyte disorder

- Disorders of Calcium, phosphorus, potassium metabolism and hemostasis
- Metabolic acidosis and Metabolic alkalosis
- Respiratory acidosis and alkalosis
- UTI

**Course Outcomes:**

- Define the medical terms, define and classify disease and understand the concepts of the disease.
- Describe the causes and mechanism of kidney diseases that occur during the routine work and also changes seen in different individuals.
- Enumerate the laboratory tests eg: urine, blood, body fluids and its application on renal diseases.

**Recommended Books:**


1. Nayak R, Rai S, Gupta A. Essentials in hematology and clinical pathology. New Delhi: Jaypee Brothers Medical Publishers; 2012.
2. Mohan H. Textbook of pathology. 8th ed. New Delhi, India: Jaypee Brothers Medical; 2018.

# APPLIED MICROBIOLOGY

## Course: Core Number of Hours: 60

## Credits: 4

## Course objectives:

- To understand urinary tract and bloodstream infections
- To study viral infections of importance
- To learn infection control measures and to understand methods of sterilization ad disinfection

**Course Content:**

**UNIT I: Bacteriology 40 Hours**

- Microbiology of UTI.
- Opportunistic infections.
- Microbiology of vascular access infection – Femoral, jugular, subclavian catheters. (Bacterial infection).
- Sampling methodologies for culture & sensitivity.
- Vancomycin resistant enterococci & other antimicrobial – resistant bacteria (Drug, resistant micro- organisms).
- Infections through contaminated HD equipment's or dialysate or errors in reprocessing.
- Non infections agents in HD pts
- Endotoxin
- Endotoxin A
- Other biological toxins
- Infection control precautions for Dialysis units

**UNIT II: Virology 10 Hours**

- Hepatotropic viruses in detail – mode of transfusion universal precautions, vaccinations.
- HIV- Mode of transfusion, universal precautions.

**UNIT III: Sterilization and disinfection** **10 Hours**

- Sterilization and disinfection classification, principle, methods
- Central sterile supply department

**Course Outcomes:**

- Enumerate urinary tract and bloodstream infections.
- Describe viral infections.
- Define infection control in dialysis setting.
- Define sterilization ad disinfection.

**Recommended Books:**


1. Anathanarayana & Panikar Medical Microbiology - University Press
2. Text book of Medical Microbiology for MLT students – C P Baveja
3. Hospital Infection Control Manual, YMCH

# GENERAL PHARMACOLOGY

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- Know the basics of Pharmacology like, sources of drugs, routes of drug administration and general principles.
- Describe the principles of pharmacokinetics and pharmacodynamics.
- To appreciate various adverse drug reactions.
- To have a basic knowledge of drugs affecting various body systems.

## Course Contents:

**Unit 1: General Pharmacology** **8 Hours**

- Introduction to Pharmacology
- Routes of drug Administration
- Absorption & Distribution
- Metabolism
- Excretion
- Pharmacodynamics - Mechanism of drug action- receptors
- Factors modifying drug actions
- Adverse drug reactions

**Unit 2: Autonomic Nervous System drugs** **6 Hours**

- Sympathomimetics
- Alpha blockers
- Beta-blockers
- Cholinomimetics
- Anticholinergics
- Skeletal muscle relaxants

**Unit 3: Central Nervous System** **11 Hours**

- Opioid analgesics

- Non-opioid analgesics (Prostaglandins)
- NSAIDs
- Ethyl alcohol
- Sedative hypnotics
- Antiepileptic drugs
- Local anesthetics-1
- Local anesthetics-2
- General anesthetics- I
- G A – II (PAM)
- CNS stimulants

**Unit 4: Cardio Vascular System Drugs** **9 Hours**

- Diuretics
- Vasodilators (CCB's, Drugs acting on RAS)
- Antihypertensives
- Antianginal drugs
- Pharmacotherapy of shocks
- Cardiac glycosides
- Cardioplegic drugs
- Antiarrhythmic drugs
- Primary solutions

**Unit 5: Blood** **6 Hours**

- Anemia, erythropoietin
- Anticoagulants
- Anti platelet drugs
- Fibrinolytics,
- Lipid lowering drugs
- Vitamin. D and calcium, folic acid, phosphate binders

**Unit 6: Endocrines** **1 Hour**

- Corticosteroids

**Unit 7: Chemotherapy** **9 Hours**

- General Principles of Chemotherapy
- Sulfonamides
- Penicillin
- Cephalosporins
- Broad spectrum antibiotics
- Macrolides
- Aminoglycosides
- Chemotherapy of UTI
- Drug Therapy of Tuberculosis

**Unit 8: Miscellaneous topics** **10 Hours**

- Antihistamines
- Antiemetics
- Drugs used in bronchial asthma-1
- Drugs used in bronchial asthma-2
- Cough
- Inhalational gases and emergency drugs
- I V fluids
- Metabolic and electrolyte imbalance
- Immunosuppressants
- Antiseptics and disinfectants

**Course Outcomes:**

At the end of the course, the students will be able to

- Define and describe the principles of pharmacology and pharmacotherapeutics
- Define absorption, distribution, metabolism and excretion of drugs
- Define, identify and describe the adverse drug reactions
- Define and describe the pharmacological actions and therapeutic uses of drugs affecting systems- autonomic nervous system, cardiovascular system, blood, endocrine etc.
- To have a basic knowledge of drugs used in the treatment of various infections

- To have a basic knowledge on miscellaneous drugs

**Recommended Books:**

1. Udaykumar P. Textbook of Pharmacology for Dental and Allied Sciences. Jaypee Brothers Publishers; 2008.

# APPLIED ANATOMY AND PHYSIOLOGY

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- To understand the anatomy and physiology of the renal system.
- To comprehend the histology of a human kidney.
- To understand the mechanism of formation of urine.
- To understand the renal regulation of blood volume and extracellular fluid volume.
- To comprehend acid base balance.

## Course Content:

### APPLIED ANATOMY

**Unit 1: Anatomy of Kidney** **2 hours**

- Structural anatomy of urinary system
- The Kidney
- The Ureter
- The Urinary bladder
- The Urethra
- The Sphincters
- The Prostate

**Unit 2: Gross anatomy of kidney** **2 hours**

- Location of Kidney
- Size
- Protection
- Blood supply of Kidney
- Nerve supply of Kidney
- Lymphatic Flow

**Unit 3: Microscopic anatomy of kidney** **3 hours**

- Nephron
- Interstitium
- Juxta Glomerular Apparatus

**Unit 4: Composition and functions of Blood** **6 hours**

- Red blood cells: Erythropoiesis, stages of differentiation function, count physiological variation.
- Hemoglobin : structure, functions, concentration physiological variation methods of Estimation of Hb
- White blood cells: Production , function, life span, count, differential count
- Platelets: Origin, normal count, morphology functions.
- Plasma Proteins – Production, concentration, types, albumin, globulin, Fibrinogen, prothrombin functions.
- Hemostasis & Blood coagulation: Hemostasis: Definition, normal hemostasis, clotting factors, mechanism of clotting, disorders of clotting factors.
- Blood Bank:
- Blood groups –
- ABO system
- Rh System
- Blood grouping & typing
- Cross matching: Rh system – Rh factor, Rh in compatibility.
- Blood transfusion – Indication, universal donor and recipient concept.
- Selection criteria of a blood donor. transfusion reactions Anticoagulants Classification, examples and uses
- Anemia's: Classification – morphological and etiological. Effects of anemia on body
- Erythrocyte sedimentation Rate (ESR) and Packed cell volume
- Blood Volume: Normal value, determination of blood volume and regulation of blood volume
- Body fluid: pH, normal value, regulation and variation
- Lymph: lymphoid tissue formation, circulation, composition and function of lymph

**Unit 5: Embryology and development of kidney in brief** **4 hours**

**Unit 6: Anatomy of Peritoneum in general** **3 hours**

**Unit 7: Anatomy of Vascular system related to Hemodialysis** **3 hours**

- Upper limb vessels: Course, distribution, branches, origin, and abnormalities.
- Neck vessels: Course, distribution, branches, origin, and abnormalities.
- Femoral vessels: Course, distribution, branches, origin, and abnormalities

**APPLIED PHYSIOLOGY**

**Unit 8: Physiology of Kidney** **6 hours**

- Functions of Kidney
- Mechanism of formation of urine
- Physiology of bladder function
- Micturition and types of bladder dysfunction
- Clearance studies

**Unit 9: Major functions of nephron and its components** **3 hours**

- Glomerulus
- PCT
- Henle's loop
- DCT
- Collecting duct

**Unit 10: Renal regulatory Mechanism** **4 hours**

- Water regulatory mechanism
- Electrolyte regulation (Sodium, Potassium, Chloride, Calcium, Phosphate, Magnesium)
- Regulation of acid – base balance

**Unit 11: Physiological values** **3 hours**

- Urea, Creatinine, Electrolytes, Calcium, Phosphorus, uric acid, Magnesium, Glucose.
- 24 hours urinary indices – urea, creatinine, electrolytes Ca, Mg

**Unit 12: Renal hormones & vit D, erythropoietin, Renin, Prostaglandins 6 hours**

**Unit 13: Hemostasis – basic principles 3 hours**

- Coagulation cascade
- Coagulation factors
- Regulation of procoagulants & anticoagulants BT, CT, PT, PTT, thrombin time

**Unit 14: Physiology of peritoneum 3 hours**

- Factors influencing solute transport
- Peritoneal permeability
- Solute characteristics
- Concentration gradient
- Peritoneal blood flow
- Dialysis solution temperature
- Available membrane area

**Unit 15: Routes of solute transport 3 hours**

- Intracellular
- Extracellular

**Unit 16: Factors that enhance diffusion 3 hours**

- Increased dialysis solution flow
- Increased blood flow
- High concentration gradient
- Pre-warmed dialysis solution
- Osmotic pressure

**Unit 17: Osmosis through the peritoneal membrane 3 hours**

- Ultrafiltration
- Drug transport

**Course Outcomes:**

- Describe the Structural & Gross anatomy of Kidney.
- Describe the microscopic structure of the kidney.
- Explain Body Fluids.
- Describe the mechanism of urine formation.
- Explain renal autoregulation.
- Describe the physiology of peritoneum.

**Recommended Books:**


1. Brenner and Rector's The Kidney – by Maarten W. Taal, Glenn M. Chertow, Philip A. Marsden, Karl Skorecki, Alan S. L. Yu, Barry M. Brenner
2. Human Anatomy – B.D. Chowrasia
3. Basics of Medical Physiology- Third edition by D.Venkatesh & H.H.Sudhakar

# RENAL DISEASE I

## Course: Core Number of Hours: 60

## Credits: 4

## Course objectives:

- To comprehend the types of kidney disease.
- To understand the pathogenesis AKI and CKD.
- To comprehend treatment options for kidney failure.
- To understand the conservative management in dialysis.

## Course Content:

**Unit 1: Acute kidney injury** **15 hours**

- Definition & classification
- Causes
- Clinical features of AKI
- Investigations of AKI
- Treatment

**Unit 2: Chronic kidney disease** **15 hours**

- Definition & classification
- Causes
- Clinical features
- Investigations
- Treatment

**Unit 3: Treatment options for kidney failure** **10 Hours**

- Treatment choice for AKI
- Treatment choice for CKD

**Unit 4: Indications for dialysis** **5 hours**

**Unit 5: Normal kidney function compared to dialysis** **5 hours**

**Unit 6: Conservative management** **5 Hours**

**Unit 7: Dialysis** **5 Hours**

- Hemodialysis
- Peritoneal dialysis

**Course Outcomes:**

- Define the types of kidney disease.
- Explain the pathogenesis of AKI and CKD.
- Explain the treatment options for kidney failure.
- Describe conservative management in dialysis setting.

**Recommended Books:**


1. Primer on Kidney Diseases – 5th by Arthur Greenberg
2. Primer on kidney diseases – 6th edition-Gilbert and weiner
3. Clinical Nephrology 3rd edition-Woo
4. Renal and electrolyte disorders – 7th edition-Robert W.Schrier

# CLINICAL DIALYSIS I

## Course: Core Practical Hours: 120

## Credits: 4

## Course objectives:

- Knowledge in Dialysis unit procedures and patient assessment.
- Patient monitoring during dialysis and patientcare record documentation.
- Comprehend Hemodialysis procedure pre-setup.

## Course Content:

**Unit 1: Introduction to dialysis unit, dialysis unit procedures and patient assessment**

**30 Hours**

- Infection control
- Dialysis unit design
- Aseptic techniques
- Vital signs
- Patient approach & assessment
- Assisting dialysis room procedures
- Preparation of dialysate

**Unit 2: Patient monitoring during dialysis & patient care record sheet documentation**

**45 Hours**

- Importance of monitoring
- Identification of sick patients
- Hyperkalemia
- Pericarditis
- Metabolic acidosis
- Sepsis patients
- Patients with cardiac problem
- Bleeding
- Cardiac arrest

**Unit 3: Patient monitoring and HD procedure pre setup** **45 Hours**

- Patient monitoring during dialysis
- Preparation of extracorporeal blood circuit
- Dialysis preset up
- Handling cardiac monitors, infusion pumps and ABG machine
- Method of documentation

**Course Outcomes:**

- Define dialysis unit procedures and patient assessment.
- Perform patient monitoring during dialysis and patientcare record documentation.
- Explain hemodialysis procedure pre-setup.

# KANNADA

**Course: Core** **Number of Hours: 30**

**Credits: 2**

## Course objectives:

- Enable students to learn alphabet, words and simple sentences in Kannada.
- Enable students to enhance speaking and writing communicative skills in Kannada and learn technical words related to medical science.

**COURSE CONTENT:**

**Unit I:** Kannada Letters (vowels, Consonant) 10 Hours

**Unit II:** Words, Phrases, formation of sentences, Letter Writing, Essay Writing. Treatment related Kannada words (from English to Kannada) 10 Hours

**Unit III:** 10 Hours

- Possible communication in kannada between Patients and Doctors.
- Advising sentences to the possible questions of patients.
- Some important sentences which enable to communicate with doctors and colleagues.

**Course Outcome**

- Allied health science students will be able to attend health issues of native Kannada speaking patients more effectively.
- They can also act as a bridge between doctors and patients.

**Recommended Books**

1. Kannada Vyakarana – (8th ,9th and 10th Karnataka government text books)
2. HSK, Vyavarahika Kannada

## FOURTH SEMESTER

## DIALYSIS THERAPY III

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- Understand the importance of priming extracorporeal blood circuit.
- Comprehend manual and automated dialyser reprocessing.
- Gain knowledge on different types of peritoneal access devices and PET test.
- Understanding and implementing infection control practices in dialysis setting.

**Course Content:**

**Unit 1: Preparation of extracorporeal blood circuit** **20 hours**

- Components of extracorporeal blood circuit
- Components of dialysate circuit
- Pre dialysis alarms and safety checking
- Parameter setting

**Unit 2: Ultrafiltration goal calculation** **5 hours**

- Checking patient weight
- Assessment of edema and dry weight
- Patient assessment for calculating weight gain and setting UF goal
- UF rate calculation- Kuf, TMP and negative pressure

**Unit 3: Dialyser reprocessing** **10 hours**

- Manual Dialyser Reprocessing
- Automated Dialyser Reprocessing

**Unit 4: Peritoneal Dialysis** **20 hours**

- Peritoneal Dialysis access
- Peritoneal Dialysis fluids

- PET test

**Unit 5: Infection control** **5 hours**

- Infection in hemodialysis
- Vaccination
- Prevention of infection spreading

**Course Outcomes:**

- Explain the importance of priming the extracorporeal blood circuit.
- Describe dialyzer reprocessing techniques.
- Explain the different types of peritoneal access devices and PET test.
- Describe the infection control practices in dialysis setting.

**Recommended Books:**


1. Oxford handbook of dialysis-2nd edition-Jeremy Levy, Julie Morgan, Edwina Brown
2. Hand Book of Hemodialysis – 5th edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

# RENAL DISEASE II

## Course: Core Number of Hours: 60

## Credits: 4

## Course objectives:

- Understand the various manifestations of renal failure, clinical features and management.
- Gain knowledge in renal stone and pregnancy associated renal disease
- Understand the renal vascular disorders and hypertension

## Course Content:

**Unit 1: Renal assessment** **10 hours**

- Purpose
- Assessment steps
- Investigations

**Unit 2: Manifestations of renal failure, its clinical features& management** **20 hours**

- Uremic solutes –Types and molecular weight,
- Medical terminology related to clinical features of renal manifestations
- Uremia
- Azotemia
- Oliguria
- Uremic encephalopathy
- Hematuria
- Proteinuria
- Edema
- Pericarditis
- Hyperkalemia
- Metabolic acidosis
- Metabolic alkalosis

**Unit 3: Renal manifestations** **10 hours**

- Fluid, electrolyte and acid-base disorders
- Bone disease and disorders of calcium and phosphate metabolism

- Cardiovascular disorders
- Gastro intestinal disorders
- Nutritional abnormalities
- Hematologic disorders
- Renal anemia- definition, signs and symptoms, causes, investigation and treatment options
- EPO therapy-EPO drugs, dosage, monitoring, iron therapy, reasons for EPO resistance, advantages, disadvantages and adverse effects.
- Skin disorders
- Neuromuscular disorders
- Endocrine-metabolic disturbances

**Unit 4: Renal stone disease** **5 hours**

**Unit 5: Pregnancy associated renal disease** **5 hours**

**Unit 6: Renal vascular disorders and hypertension associated renal diseases** **10 hours**

## Course Outcomes:

- Explain the clinical features, management and manifestation of renal failure.
- Brief about renal stone and pregnancy associated renal diseases.
- Describe renal vascular disorders.

## Text book / Reference Books:


1. Essentials of nephrology-2nd edition- editor-R Kasi Visweswaran-BI publications Pvt Ltd New delhi.
2. Clinical management of chronic kidney disease- 1st edition-william M. McClellan.
3. Oxford handbook of dialysis-2nd edition-Jeremy Levy,Julie Morgan, Edwina Brown.
4. Primer on kidney diseases -5th & edition- editor -Arthur Greenberg- NKF- Saunders, Elsevier.
5. Management of acute kidney problems –Jorres, Ronco, Kellum.

# APPLIED PHARMACOLOGY

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- Understanding the various pharmacological agents used in dialysis patients, route of administration, side effects, toxicity and its uses.
- Understanding pharmacotherapeutic interventions and their interactions with patient recover process.
- Comprehend utilization of dialysis fluid composition and various disinfectants used in dialysis procedures.

## Course Content:

**Unit 1: IV fluid therapy with special emphasis in renal disease.** **5 hours**

**Unit 2: Diuretics** **5 Hours**

- Classification
- Actions
- Dosage
- Side effects
- Contraindications

**Unit 3: Antihypertensive** **5 Hours**

- Classification
- Action
- Dosage
- Side effects
- Contraindications
- Special reference during dialysis
- Vasopressors

**Unit 4: Drugs & Dialysis** **5 Hours**

- Dose & duration of administration of drugs

**Unit 5: Dialysable drugs** **5 Hours**

- Phenobarbitone
- Lithium
- Methanol

**Unit 6: Vitamins** **5 Hours**

- Vit D & its analogues
- Phosphate binders
- Iron
- Folic acid

**Unit 7: Erythropoietin in detail** **5 hours**

**Unit 8: Heparin including low molecular weight heparin** **2 hours**

**Unit 9: Protamine sulphate** **1 hours**

**Unit 10: Disinfectant agents** **5 Hours**

- Glutaraldehyde
- Sodium hypochlorite
- Hydrogen peroxide role as disinfectants
- Adverse effects of residual particles applicable to glutaraldehyde

**Unit 11: Hemodialysis concentrates** **1 Hours**

- Composition & dilution (Acetate & bicarbonates)

**Unit 12: PD fluid in particular hypertonic solutions composition** **1 Hours**

- Dextrose
- Icodextrin

**Unit 13: Potassium exchange resins with special emphasis on mode of administration**

**2 Hours**

**Unit 14: Ionotropic drugs** **10 Hours**

- Dopamine
- Dobutamine
- Adrenaline
- Isoprenaline
- Noradrenaline

**Unit 15: Vasodilator** **3 Hours**

- Nitroglycerine
- Nitroprusside

## Course Outcomes:

- Describe the various pharmacological agents used in dialysis patients, route of administration, side effects, toxicity and its uses.
- Explain the pharmacotherapeutic interventions and their interactions with patient recover process.
- Describe the utilization of dialysis fluid composition and various disinfectants used in dialysis procedures.

## Text book / Reference Books:

**1**. K.D. Tripathi, Essentials of Medical Pharmacology, 6$^{th}$ edition, Jaypee brothers medical publishers (P) Ltd

# RENAL NUTRITION

## Course: Core Number of Hours: 60

## Credits: 4

## Course Objectives:

- Understanding the concepts of nutrition and diet requirements in renal disorder and ESRD patients.
- Gain knowledge in renal nutrition and psychological issues of ESRD.

## Course Content:

**Unit 1: Introduction to nutrition: 15 hours**

- Definition
- Food pattern and its relation to health
- Factors influencing food habits
- Superstitions, culture, religion, income, composition of family, age, occupation,
- special groups etc
- Food selection, storage and preservation
- Prevention of food adulteration

**Unit 2: Classification of nutrition 15 hours**

- Macronutrients and micronutrients
- Sources, requirements and deficiency of carbohydrates
- Types, sources, requirements and deficiency of fats
- Types, sources, requirements and deficiency of proteins
- Sources, requirements and storage of drinking water
- Types, sources, requirements and deficiency of minerals
- Types, sources, requirements and deficiency of vitamins

**Unit 3: Planning of diets 15 hours**

- Need for planning of diets
- Concepts of balanced diet

- Food groups and balanced diet
- Influence of age, sex, occupation and physiological state
- Recommended dietary intake for dialysis patients
- Steps in planning balanced diet
- Concepts of balanced diet for dialysis patients
- Planning diet for dialysis patients
- Steps in planning balanced diet for dialysis patients

**Unit 4: Renal nutrition and psychological issues of ESRD** **15 hours**

- Components of nutrition
- Malnutrition
- Diet in chronic kidney disease
- Diet in acute kidney injury

**Course Outcomes:**

- Describe the diet requirements in renal disorder and in ESRD patients.
- Explain renal nutrition and psychological issues of ESRD

**Recommended Books:**

1.B.Sreelakshmi, food science, 5th ed. 2012, new age international Limited, publishers. New Delhi.

2. Dr. M Sawaminathan, hand book on food and nutrition, 1st edition, 2004, Ganesh publishers.

# CLINICAL DIALYSIS II

## Course: Core Number of Hours: 120

## Credits: 4

## Course objectives:

- Comprehend extracorporeal blood circuit priming procedures.
- Understanding Dialysis Catheters.
- Knowledge on disinfectants used in dialysis unit and its adverse effects.

**Course Content:**

**Unit 1: Extracorporeal blood circuit priming & recirculation 30 Hours**

- Purpose
- Assembling
- Steps of priming

**Unit 2: Dialysis catheters 30 Hours**

- Types, design
- Catheter care
- Starting dialysis with catheters

**Unit 3: Disinfection 30 Hours**

- Introduction
- Types of disinfectants used in dialysis & adverse effects

**Unit 4: Blood circuit priming and handling dialysis catheters 30 Hours**

- Blood circuit priming
- Dialysis catheters handling-dressing and removal
- Preparation of disinfectants used in dialysis
- Identification of alarms and alarm reset

**Course Outcomes:**

- Perform extracorporeal blood circuit priming procedures.
- Describe the different types of Dialysis Catheters.
- Brief on disinfectants used in dialysis unit and its adverse effects.

# HUMAN RIGHTS AND GENDER EQUITY

**Course: AECC** **Number of Hours: 30**

**Credits: 2**

## Course objectives:

- To make the student understand the human rights as citizens of India.

**COURSE CONTENT:**

**Unit 1:** Human Rights 5 Hours

- Human Rights- Meaning
- Universal declaration of Human rights

**Unit 2:** Human Rights Advocacy 5 Hours

- Global Advocacy of human rights amnesty international and other organizations
- Peoples union for Civil Liberty (PUCL)
- Human Rights Commission in India
- Minority Commission in India
- Remedies against Violation of Human rights in India

**Unit 3 :** Gender Equity 5 Hours

- Key Concepts- Gender and sex- Masculinity and Feminity, Partriarchy- Matriarchy, Gender roles and attributes, Gender division or labour, Gender Bias, Gender Stereotypes, Need for Gender Sensitization.

**Unit 4:** Woman Status in India 5 Hours

- Important indicators- Six Ratio, Education, Health, Nutrition, Material and Infant Mortality, Work Participation rate, Political Participation.

**Unit 5:** Contemporary Women's Issues 5 Hours

- Discrimination against Girl child
- Violence against women
- Problems of health and nutrition

- Women’s education gender bias in education
- Trafficking in Women
- Globalization and Impact on Women

**Unit 6:** State Initiatives on Gender Issues 5 Hours

- Constitutional Rights of Women
- Laws Pertaining to Women
- The National Commission for Women

## Course Outcome:

- Basic Knowledge of Human Rights and its function and authorities in society and industry women’s status, issues and gender equity.

## Recommended Books:


1. Parvathy Appaiah,Human Rights, Gender Equity and Environmental Studies, Shivam Books publishers, 2012.
2. Parvathy Appaiah,Human Rights, Gender Equity and Environmental Studies, Jai Bharath Prakashan publishers, 2016.
3. Parvathy Appaiah,Human Rights, Gender Equity and Environmental Studies, Jai Bharath Prakashan publishers, 2018-19.

# BIOSTATISTICS

## Course: AECC Number of Hours: 30

## Credits: 2

## Course Objectives:

- Understands statistical terms.
- Possesses knowledge and skill in the use of basic statistical methods.

**COURSE CONTENT:**

**Unit 1: Introduction** **3 hours**

- Meaning, definition of statistics.
- Importance of the study of statistics.
- Branches of statistics.
- Statistics and health science including nursing.
- Parameters and estimates.
- Descriptive and inferential statistics.
- Variables and their types.
- Measurement scales

**Unit 2 : Tabulation of Data** **3 hours**

- Raw data, the array, frequency distribution
- Basic principles of graphical representation
- Types of diagrams - histograms, frequency polygons, smooth frequency polygon, commulative frequency curve, ogive.
- Normal probability curve.

**Unit 3: Measure of Central Tendency** **4 hours**

- Need for measures of central tendency
- Definition and calculation of mean - ungrouped and grouped
- Meaning, interpretation and calculation of median ungrouped and grouped
- Meaning and calculation of mode.

- Comparison of the mean, and mode.

**Unit 4: Measure of Variability** **6 hours**

- Need for measure of dispersion. The range, the average deviation.
- The variance and standard deviation.
- Calculation of variance and standard deviation ungrouped and grouped.
- Properties and uses of variance

**Unit 5: Probability and Standard Distributions** **6 hours**

- Meaning of probability of standard distribution.
- The Binominal distribution.
- The normal distribution.
- Divergence from normality - skewness, kurtosis.

**Unit 6: Sampling Techniques** **5 hours**

- Need for sampling - Criteria for good samples.
- Various sampling designs.
- Procedures of sampling and sampling designs errors.
- Sampling variation.
- Tests of significance.

**Unit 7: Health Indicator** **3 hours**

- Importance of health Indicator.
- Indicators of population, morbidity, mortality, health services.
- Calculation of rates and rations of health.

**Course Outcomes**

- Gains Knowledge in application of statistics in medical field and research.
- Possesses knowledge and skill in the use of basic statistical methods.

**Recommended Books.**

**1.** Mahajan BK, Gupta MC. Textbook of preventive and social medicine. Jaypee Brothers; 1995.

## FIFTH SEMESTER

## APPLIED DIALYSIS TECHNOLOGY I

**Course: Core** **Number of Hours: 60**

**Credits: 4**

**Course objectives:**

- Understanding the concepts of adequacy of dialysis, anticoagulation requirements and abnormalities seen in dialysis patients.
- Comprehend special problems pertaining to genitourinary tract and male reproductive organs in CKD patients.

**Course Content:**

**Unit 1: Adequacy of dialysis** **5 hours**

- Hemodialysis
- Peritoneal dialysis.

**Unit 2: Erythropoietin in detail** **5 hours**

**Unit 3: Anticoagulation during dialysis** **5 hours**

**Unit 4: Applied Aspect** **45 Hours**

- Endocrine disturbances in dialysis patients
- Diabetes in dialysis patients
- Bone disease
- Aluminum toxicity
- Sleep disorders
- Psychological aspect of dialysis patients
- Musculoskeletal and rheumatologic disease
- Special problems pertaining to genitor urinary tract and male reproductive organs in chronic renal failure patients
- Metabolic abnormalities
- Gastrointestinal diseases in dialysis patients

- Dialysis Amyloidisis
- Ascites in dialysis patients

## Course Outcomes:

- Define the concepts of adequacy of dialysis, anticoagulation requirements and abnormalities seen in dialysis patients.
- Describe special problems pertaining to genitourinary tract and male reproductive organs in CKD patients.

## Recommended Books:

1. Oxford handbook of dialysis-2nd edition-Jeremy Levy,Julie Morgan, Edwina Brown
2. Hand Book of Hemodialysis – 5th edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

# APPLIED DIALYSIS TECHNOLOGY II

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- Understanding the concepts of Metabolic Acidosis, Metabolic Alkalosis and renal failure In liver disease.
- Understanding renal diseases associated with HIV.
- Knowledge in principles of ICU care.

## Course Content:

**Unit 1: Metabolic abnormalities** **10 Hours**

- Metabolic Acidosis
- Metabolic Alkalosis

**Unit 2: Applied Aspects** **45 Hours**

- Renal function in liver disease
- Renal involvement in systemic vasculitis
- Renal manifestation in SLE and rheumatic disorder
- Diabetic nephropathy
- HUS/TTP
- Renal disease associated with HIV
- Care for HIV infected dialysis patients
- Hyperoxaluria
- VUR and reflux nephropathy
- UTI
- Extracorporeal Shockwave Lithotripsy (ESWL)
- Hereditary renal disorder
- Neurologic aspects of uremia

**Unit 3: Principles of ICU care** **5 Hours**

**Course Outcomes:**

- Describe the concepts of Metabolic Acidosis, Metabolic Alkalosis and renal failure In liver disease
- Explain renal diseases associated with HIV
- Elaborate the principles of ICU care

**Recommended Books:**


1. Oxford handbook of dialysis-2nd edition-Jeremy Levy, Julie Morgan, Edwina
2. Brown Hand Book of Hemodialysis – 5th edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

# HEMODIALYSIS GUIDELINES

## Course: Core Number of Hours: 45

## Credits: 3

## Course objectives:

- Understanding the concepts of Bioethics related to dialysis.
- Comprehend guidelines for hemodialysis unit.

## Course Content:

**Unit 1: Bioethics related to dialysis** **15 hours**

- Dialysis therapist professionalism
- Professional boundaries
- Ethical and social issues in dialysis
- Ethical and social issues in renal transplantation

**Unit 2: Guidelines for hemodialysis unit** **30 hours**

- Setting up of HD unit
- Staff, infrastructure and instruments
- Machine and dialyser
- Dialysis fluid
- Water treatment
- Vascular access
- Priming. connecting and disconnecting
- Anticoagulation
- Dialyser reuse
- Dialysis dose
- Dialysis infection prevention

**Course objectives:**

- Define the concepts of Bioethics related to dialysis.
- Comprehend the guidelines of hemodialysis unit.

**Recommended books:**

1. Indian Journal of Nephrology-Indian Society of Nephrology Guidelines for Hemodialysis.

# RENAL DIALYSIS TECHNOLOGY RELATED WITH LABORATORY, CARDIOLOGY & IMAGING TECHNOLOGY

**Course: Core** **Number of Hours: 45**

**Credits: 3**

## Course objectives:

- Understanding the concepts of Laboratory technology related to dialysis technology.
- Understanding the concepts of Cardiology related to dialysis technology.
- Understanding the concepts of Imaging related to dialysis technology.

**Course Content:**

**Unit 1: Laboratory technology** **15 Hours**

- Lab tests related to Nephrology
- Hematological tests
- Biochemistry tests (GFR, RFT, LFT, Urinalysis etc.)
- Blood grouping and cross matching
- Basics of immunology & tests
- Microbiology (Viral infections (HBsAg , HCV, HIV, CMV, BKV)
- Biopsy tests
- Centrifugal plasmapheresis

**Unit 2: Cardiology** **15 Hours**

- Vital signs
- Vital signs measurement
- Signs and symptoms of heart failure
- Heart problems associated with renal failure
- Hypertension –definition, stages, symptoms etiology, management
- LVH, cardiomegaly
- Tachycardia, bradycardia
- Pericarditis, pericardial effusion, pericardial tamponade,
- Measurement and importance of 24 hours BP monitoring
- Basic electrocardiography (ECG)

- The normal electrocardiogram
- ECG changes during hyperkalemia, cardiac arrest

**Unit 3: Imaging technology** **15 Hours**

- X ray Ultrasound, Doppler, CT scan, MRI
- Contrast media

**Course Outcomes:**

- Define the concepts of Laboratory technology related to dialysis technology.
- Define the concepts of Cardiology related to dialysis technology.
- Define the concepts of Imaging related to dialysis technology.

**Recommended books:**


1. Leo Schamroth - Electrocardiography
2. Mervin Goldmann - Electrocardiography
3. Marriott's Practical Electrocardiography
4. Textbook of Microbiology - by R. Ananthanarayan (Author), Arti Kapil (Editor)
5. Textbook of Medical Biochemistry - by MN Chatterjea, Rana Shinde
6. Robbins Basic Pathology - by Vinay Kumar, Abul K. Abbas, Jon C. Aster
7. Christensen’s physics of diagnostic radiology by Thomas S. Curry, James E, Dowdey, Robert C. Murry

# CLINICAL DIALYSIS III

## Course: Core Practical Hours: 120

## Credits: 4

## Course objectives:

- Understand the universal protocol of haemodialysis procedure.
- Knowledge on maintenance and management of water treatment plant.
- Comprehend Dialysis reprocessing.

**Course Content:**

**Unit 1: Hemodialysis procedure** **40 Hours**

- Following HD prescription
- Initiation
- setting parameters and termination

**Unit 2: Water treatment** **40 Hours**

- Types of filters
- Maintenance & disinfection
- Monitoring and testing water quality
- Quality maintenance and documentation

**Unit 3: Dialyser reprocessing** **40 Hours**

- Types and purpose
- Steps of reprocessing & documentation

**Course Outcomes:**

- Follow the universal protocol of haemodialysis procedure.
- Perform maintenance and management of water treatment plant.
- Perform Dialysis reprocessing.

## SIXTH SEMESTER

## ADVANCED DIALYSIS TECHNOLOGY I

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- Understand Hemodialysis Prescription
- Comprehend Peritoneal Dialysis
- Understand recent advances in dialysis

## Course Content:

**Unit 1: Hemodialysis Prescription** **5 Hours**

**Unit 2: Peritoneal dialysis: Part 4** **15 Hours**

- History of peritoneal dialysis
- Physiology of peritoneal dialysis
- Indications and contraindications of peritoneal dialysis
- Peritoneal dialysis apparatus
- Peritoneal dialysis therapies
- Peritoneal dialysis access
- Catheter and exit-site care
- Peritoneal dialysis process
- Assessment of peritoneal membrane permeability
- Complications and management
- Advantages and disadvantages, HD & PD comparison

**Unit 3: Biochemical investigations required for renal dialysis** **5 Hours**

**Unit 4: Complications** **10 Hours**

- Acute and chronic complications of haemodialysis
- Acute and chronic complications of peritoneal dialysis
- Complications associated with vascular access
- Infection in dialysis patients

**Unit 5: Machine** **10 hours**

- Dialysis Machine maintenance
- Clean and disinfect dialysis machine
- Machine disinfection procedure
- Readiness of other emergency equipment's
- Verify Calibration of medical equipment's in dialysis unit
- Recognize errors in dialysate and blood flow rate

**Unit 6: Withdrawal of dialysis criteria** **5 hours**

- Acute dialysis
- Chronic dialysis

**Unit 7: Recent advances in haemodialysis** **10 hours**

- Nocturnal dialysis
- Online dialysis
- Daily dialysis

**Unit 8: Telemedicine in dialysis practice** **5 hours**

**Course Outcomes:**

- Define Hemodialysis Prescription.
- Elaborate Peritoneal Dialysis.
- Elaborate recent advances in dialysis.

**Recommended Books:**

1. Oxford handbook of dialysis-2nd edition-Jeremy Levy, Julie Morgan, Edwina Brown
2. Hand Book of Hemodialysis – 5th edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

# ADVANCED DIALYSIS TECHNOLOGY II

**Course: Core** **Number of Hours: 60**

**Credits: 4**

## Course objectives:

- Understanding special dialysis procedures like CRRT, SLED, MARS etc.
- Comprehend dialysis in special situations.

## Course Content:

**Unit 1: Special dialysis procedures** **30 hours**

- High flux high efficiency dialysis
- Hemofiltration
- Hemodiafiltration
- Continuous therapies in haemodialysis
- SLED
- MARS
- Hemoperfusion
- Plasmapheresis

**Unit 2: Dialysis in special situations** **30 hours**

- Cardiovascular diseases in CKD patients
- Neurological aspects of uremia
- Advanced liver diseases
- Dialysis in patients positive for HIV, HBsAg & HCV
- Pregnancy in dialysis patients
- Pediatric dialysis

**Course Outcomes:**

- Define special dialysis procedures like CRRT, SLED, MARS etc
- Understand and perform dialysis in special situations

**Recommended Books:**

1. Oxford handbook of dialysis-2nd edition-Jeremy Levy, Julie Morgan, Edwina Brown
2. Hand Book of Hemodialysis – 5th edition – John T. Daugirdas, Peter G. Blake, Todd S. Ing

# RENAL TRANSPLANTATION

## Course: Core Number of Hours: 60

## Credits: 4

## Course objectives:

- Understanding the concept of Organ transplant
- Knowledge on Transplant immunology
- Understanding the principles, indications and types of Renal transplant

## Course Content:

**Unit 1: Organ transplant** **15 Hours**

- Introduction
- Definition
- Types

**Unit 2: Transplant immunology** **15 Hours**

- Innate & acquired immunology
- HLA and its significance
- Transplant grouping and cross match

**Unit 3: Renal transplant** **30 Hours**

- Introduction
- Definition
- Principles
- Indications and Contraindications to kidney transplantation
- Types
- Classification
- Advantages and disadvantages of living donor kidney transplantation Procedure
- Pre transplant work up
- Evaluation of donors and recipients
- Initial tests for potential live kidney donor

- Routine tests for potential kidney transplant recipients
- Relative and absolute contraindications to live & cadaver kidney donation
- Post-transplant care, complications and management
- Immunosuppressive therapy in kidney transplantation
- Induction therapy
- Maintenance therapy

**Course Outcomes:**

- Define the concept of Organ transplant.
- Describe Transplant immunology.
- Elaborate the principles, indications and types of Renal transplant.

**Recommended books:**


1. Kidney Transplantation - Principles and Practice – by Peter Morris, Stuart J. Knechtle
2. Hand book of Kidney Transplantation – by Gabriel M Danovitch, MD
3. Comprehensive Clinical Nephrology – Richard J. Johnson, John Feehally, Jurgen
4. Primer on Kidney Diseases – by Arthur Greenberg
5. Atlas of organ transplantation-springer

# CLINICAL DIALYSIS IV

## Course: Core Practical Hours: 120

## Credits: 4

## Course objectives:

- Comprehend the care for Vascular access, needling and independent handling of dialysis procedure.
- Understanding Extracorporeal blood therapies and ICU dialysis.
- Knowledge on AVF and AVG needling techniques.

## Course Contents:

**Unit 1: Dialyser reprocessing, maintenance of water treatment plant and conducting hemodialysis 30 Hours**

- Dialyser reprocessing
- Water treatment plant
- Starting dialysis with catheters
- Dialysis prescription
- Dialysis initiation
- Parameter settings
- Dialysis termination

**Unit 2: Vascular access care, needling and independent handling of dialysis procedure 30 Hours**

- Vascular access assessment and care
- AVF/AVG cannulation & techniques
- Fistula needle removal
- Dialysis unit maintenance record documentation
- Independent handling of dialysis procedure

**Unit 3: Extracorporeal blood therapies and ICU dialysis** **30 Hours**

- Exposure to special extracorporeal blood therapies
- Individual handling of ICU dialysis cases, Saline dialysis and SLED
- Counselling
- Hemodialysis procedure demonstration

**Unit 4: AVF and AVG needling technique** **20 Hours**

**Unit 5: PD procedure & special procedures** **10 Hours**

**Course Outcomes:**

- Perform the care for Vascular access, needling and independent handling of dialysis procedure.
- Describe extracorporeal blood therapies and ICU dialysis.
- Comprehend AVF and AVG needling techniques.