



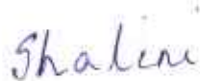
**RAMAIAH  
UNIVERSITY**  
OF APPLIED SCIENCES

**M.S. Ramaiah University of Applied Sciences**  
**Programme Structure and Course Details**  
**Of**  
**DM Nephrology 2022 onwards**

**M.S. Ramaiah University of Applied Sciences**  
**Ramaiah Medical College**

  
Registrar  
M.S. Ramaiah University of Applied Sciences  
Bangalore - 560 054

  
Dean - Academics  
M.S. Ramaiah University of Applied Sciences  
Bangalore-560054

  
Principal and Dean  
M.S. Ramaiah Medical College and Hospital  
M.S. Ramaiah University of Applied Sciences  
Bangalore - 560054



**RAMAIAH  
UNIVERSITY**  
OF APPLIED SCIENCES

**M.S. Ramaiah University of Applied Sciences**

**Programme Specifications**

**DM Nephrology Programme 2022 onwards**

**Programme Code: MD154**

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**Ramaiah Medical College**

  
Registrar  
M.S. Ramaiah University of Applied Sciences  
Bangalore - 560 054



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M.S. Ramaiah Medical College and Hospital  
M.S. Ramaiah University of Applied Sciences  
Bangalore-560054



Dean Academics

M.S. Ramaiah University of Applied Sciences  
Bangalore-560054

## University's Vision, Mission and Objectives

The M. S. Ramaiah University of Applied Sciences (MSRUAS) will focus on student-centric professional education and motivates its staff and students to contribute significantly to the growth of technology, science, economy and society through their imaginative, creative and innovative pursuits. Hence, the University has articulated the following vision and objectives.

### Vision

MSRUAS aspires to be the premier university of choice in Asia for student centric professional education and services with a strong focus on applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment

### Mission

Our purpose is the creation and dissemination of knowledge. We are committed to creativity, innovation and excellence in our teaching and research. We value integrity, quality and teamwork in all our endeavors. We inspire critical thinking, personal development and a passion for lifelong learning. We serve the technical, scientific and economic needs of our Society.

### Objectives

1. To disseminate knowledge and skills through instructions, teaching, training, seminars, workshops and symposia in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to equip students and scholars to meet the needs of industries, business and society
2. To generate knowledge through research in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to meet the challenges that arise in industry, business and society
3. To promote health, human well-being and provide holistic healthcare
4. To provide technical and scientific solutions to real life problems posed by industry, business and society in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences
5. To instill the spirit of entrepreneurship in our youth to help create more career opportunities in the society by incubating and nurturing technology product ideas and supporting technology backed business
6. To identify and nurture leadership skills in students and help in the development of our future leaders to enrich the society we live in
7. To develop partnership with universities, industries, businesses, research establishments, NGOs, international organizations, governmental organizations in India and abroad to enrich the experiences of faculties and students through research and developmental programme.

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Programme Specifications: DM Nephrology

Faculty	Ramaiah Medical College
Department	Nephrology
Programme	DM- Nephrology
Programme Code	DM 154
Dean of Faculty	Dr. Shalini C Nooyi
Head of the Department	Dr. Mahesh E

1. Title of the Award: DM Nephrology
2. Mode of Study: Full-Time
3. Awarding Institution /Body: M. S. Ramaiah University of Applied Sciences, Bengaluru
4. Joint Award: Not Applicable
5. Teaching Institution: Ramaiah Medical College
6. Date of Programme Specifications: September 2022
7. Date of Programme approval by the academic Council of MSRUAS : 27<sup>th</sup> September 2022
8. Programme Approving Regulating Body and Date of Approval: National Medical Council of India
9. Rationale for the Programme

Competency based postgraduate training programme for DM in Nephrology aims to produce a postgraduate student, who after undergoing the required training should be able to deal effectively with the needs of the community and should be competent to handle all basic issues related to renal disorders and hemodialysis (HD) units. The postgraduate students must gain ample of knowledge and experience in the diagnosis and treatment of patients with renal diseases. He / She should also acquire skills in establishing a HD unit and in training and supervising paramedical and dialysis staff. He / She should be aware of his/her limitations and should be able to decide the point of referral.

The core components of clinical services of the specialty of Nephrology revolves around taking care of acute kidney injury (AKI), chronic kidney disease (CKD) patients, patients with glomerular, tubulointerstitial and vascular disorders, initiating and monitoring dialysis therapy and managing intradialytic complications. In renal transplant unit, the services include evaluating prospective renal donors and recipients, manage renal



transplant recipients in the perioperative and postoperative period. In addition, nephrology consultation services and dialysis should be extended round the clock for all basic specialties and Intensive Care Unit (ICU) s, when there are requirements.

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Ramaiah medical college is recognized worldwide for its infrastructure and innovative teaching learning methodologies. We have a strong medical education unit which helps the post graduates to improve on their teaching and communication skills. The division of research and patents will guide the post graduate student to carry out research projects effectively. With competent faculty we will help the post graduate to be a best teacher and a researcher.



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**Programme objectives (PO) for DM Nephrology Postgraduate students**

- PO1.** General and specialist aspects of nephrology (C, A, P)
- PO2.** Supervision of long-term collaborative management plans for larger number of patients. (A)
- PO3.** Leadership for HD and Peritoneal Dialysis (PD) units (A)
- PO4.** Teaching paramedical staff and supervision of junior colleagues, (C, P)
- PO5.** Effective functioning of nephrology services in collaboration with medical units and ICUs. (C, A)
- PO6.** Ability to plan professional development as a contribution to the Holistic growth of specialty including patient care, teaching/training and research. (C, A, P)

**Programme specific outcome (PSO) for DM Nephrology Postgraduate students**

- PSO1.** Competence to practice the speciality in the community with the training obtained in the scientific and clinical aspects of the speciality of Nephrology. (C, P)
- PSO2.** The competence to practice the speciality with care and comparison thereby delivering the highest standard of Nephrology care to the community (C, A, P)
- PSO3.** Competency in the academic and research aspects of Nephrology.(C)
- PSO4.** Possession of the current, latest, scientific and evidence-based knowledge pertaining to the specialty of Nephrology. (C)
- PSO5.** The skills required to undertake independent clinical practice in Nephrology. (P)
- PSO6.** The Attitude of punctuality, reliability, responsibility, accountability and caring. (A)
- PSO7.** A good and sound foundation of Ethical Values in the practice of Nephrology (A)
- PSO8.** Competence to be an effective teacher and communicator in Nephrology. (C, P)
- PSO9.** The ability to effectively communicate with patients, peers and the community in the discharge of his/her clinical role (A)

**Note: A- Affective Domain, C- Cognitive Domain & P- Psychomotor Domain**



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Course-PO-PSO MappingCO & PO Mapping

Course Code and name	Program Objectives					
	PO1	PO2	PO3	PO4	PO5	PO6
DMC517A Basic Medical Sciences related to Nephrology	3	1	1	2	2	2
DMC518A Clinical Nephrology	3	3	3	3	3	3
DMC519A Hemodialysis, Peritoneal Dialysis, Renal transplantation	2	2	3	3	2	3
DMC520A Research methods, Recent Advances and Interventional Nephrology.	2	2	2	2	3	3

CO & PSO Mapping

Course Code and name	Program Specific Outcomes								
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
DMC517A Basic Medical Sciences related to Nephrology	2	2	3	3	3	2	2	3	3
DMC518A Clinical Nephrology	2	2	3	3	3	2	2	3	3
DMC519A Hemodialysis, Peritoneal Dialysis, Renal transplantation	2	2	3	3	3	2	2	3	3
DMC520A Research methods, Recent Advances and Interventional Nephrology.	2	2	3	3	3	2	2	3	3

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M.S. Ramaiah Medical College and Hospital  
M.S. Ramaiah University of Applied Sciences  
Bangalore-560054

M. S. Ramaiah University of Applied Sciences

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Bangalore-560054

**10. Regulations:****(A) Attendance, Progress and Conduct**

1. A candidate pursuing degree course should work in the concerned department of the institution for the full period as a full time student. No candidate is permitted to run or work in clinic/laboratory/nursing home while studying postgraduate course. No candidate shall join any other course of study or appear for any other examination conducted by this university or any other university in India or abroad during the period of study.
2. Each term shall be taken as a unit for the purpose of calculating attendance. Attendance of 80% every term is mandatory for appearing in the final university examination.
3. Every student shall attend symposia, seminars, conferences, journal review meetings, grand rounds, CPC, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself / herself from work without valid reasons.
4. Every candidate is required to attend a minimum of 80% of the training during each academic term of the post graduate course. Provided further, leave of any kind shall not be counted as part of academic term without prejudice to minimum 80% attendance of training period every term.
5. Any student who fails to complete the course in the manner stated above shall not be permitted to appear for the University Examinations.

**(B) Monitoring of progress of Studies**

1. Work diary / Log Book - Every candidate shall maintain a work diary and record of his/her participation in the training programmes conducted by the department such as journal reviews, seminars, etc. as per the model checklists and logbook specimen copy.
2. Special mention may be made of the presentations by the candidate as well as details of clinical or planning procedures, if any conducted by the candidate. The work diary shall be scrutinized and certified by the Head of the Department and Head of the Institution, and presented in the university practical/clinical examination.
3. Procedure for defaulters: There will be a committee constituted by all teachers to review such situations. The defaulting candidate is counselled by the guide and head of the department. In extreme cases of default, the departmental committee may recommend that defaulting candidate will be withheld from appearing the examination, if she/he fails to fulfil the

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requirements in spite of being given adequate chances to set himself or herself right.

### 11. Teaching Learning Methods:

This being a highly dedicated PG specialty introducing several new concepts/subjects in the course, it is recommended to divide the entire course into two components consisting of First Year of BASIC CONCEPTS OF THE SPECIALTY and the next two years of INTENSIVE CLINICAL TRAINING IN THE SPECIALTY.

Didactic lectures are of least importance; seminars, journal clubs, symposia, reviews, and guest lectures should get priority for acquiring theoretical knowledge. Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. Students should have hands-on training in performing various procedures and ability to interpret results of various tests/investigations.

Exposure to newer specialized diagnostic/therapeutic procedures should be given. Importance should be attached to ward rounds especially in conjunction with emergency admissions. Supervision of work in outpatient department should cover the whole range of work in the unit. It is particularly necessary to attend sub-specialty and symptom specific clinics. The development of independent skills is an important facet of postgraduate training. Joint meetings with physician colleagues, e.g. Urology, Vascular Surgery, Pathologists and Radiology play a valuable part in training.

The training techniques and approach should be based on principles of adult learning. It should provide opportunities initially for practicing skills in controlled or simulated situations. Repetitions would be necessary to become competent or proficient in a particular skill. The more realistic the learning situation, the more effective will be the learning.

Clinical training should include measures for assessing competence in skills being taught and providing feedback on progress towards a satisfactory standard of performance. Time must be available for academic work and audit. The following is a rough guideline to various teaching/learning activities that may be employed:

1. Clinical Case Discussion (daily)
2. Morbidity-Mortality Discussion (monthly)
3. Dialysis audit presentation (monthly)
4. Lectures, Seminars and Journal Clubs
5. Presentation of progress report on the research projects



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6. Simulation Laboratory (for tunneled hemodialysis catheter and CAPD catheter insertion)
7. Joint inter-departmental academic meets with urology, radiology, pathology etc.
8. Departmental Clinical Meetings/ Grand Rounds (weekly)
9. Multi-departmental Combined Grand Rounds / Joint Academic Activities of the Institution  
(Clinical society meet)

#### **Formal Teaching:**

- **Journal Club:** 1 hour duration - Paper presentation/discussion - once a month.
- **Seminar:** One seminar every week of one hour duration.
- **Lecture/discussion:** Lectures/ discussion on newer topics by faculty, in place of seminar as per need.
- **Case presentation in the ward.** Post graduate students will present a clinical case for discussion before a faculty and discussion made pertaining to its management and decision to be recorded in case files.
- **Case conference:** Post graduate students are expected to work up one long case or two short cases and present the same to a faculty member and discuss the management.
- **Combined Round/Grand Round:** These exercises are to be done for the hospital once a week involving presentation of unusual or difficult cases. Presentation of cases in clinical combined/grand rounds and clinical series/research data
- **Symposium:** Extensive discussion of a clinical topic by resident (bimonthly)
- **Renal transplant meeting:** Nephrology - urology departments faculty and residents discuss about the transplant cases posted for surgery (monthly once)
- **Emergency situation:** Casualty duty to be arranged by rotation among the students with a faculty cover daily by rotation.
- **Bedside clinical training for patient care management:** Daily for half to one hour during ward round with faculty and 1-2 hours in the evening by post graduate students /faculty on emergency duty, bed side patient care discussions are to be made.
- **Clinical teaching:** In OPD, ward rounds, emergency, ICU and the operation theatres.
- PG students shall be required to participate in the teaching and training programme of MD (medicine) postgraduate students and interns.
- PG students should attend conferences/CMEs/Workshops during tenure.



A DM Nephrology postgraduate student would be required to present one poster

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Principal and Dean  
M.S. Ramiah University of Applied Sciences  
Bangalore-560054

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Bangalore-560054



presentation, to read one paper at a national/ regional/ state conference and to present one research paper which should be published/ accepted for publication/ sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the degree examination.

#### Log Book:

Postgraduate students shall maintain a log book of the work carried out by them and the training programme undergone during the period of training including details of procedures assisted or done independently by them. Also, all the academic activities carried out in the department, presentations in conferences and seminars and research activities shall be entered. Log book shall be checked and assessed periodically by the faculty members imparting the training.

#### 12. Clinical and Practical Training/posting:

Teaching and training of students shall include graded all round patient care responsibilities including clinical diagnosis, invasive diagnostic and therapeutic procedures and advanced decision making in the management of renal disorders.

To achieve these objectives, the postgraduate students would be asked to spend their time in the following manner:

<u>POSTINGS</u>	<u>DURATION</u>
Nephrology Wards	8 months
Nephrology OPD	6 months
Hemodialysis + CAPD	6 months
Renal Transplantation	3months
Interventional Nephrology	3 months
Paediatric Nephrology	1 month
Critical Care Nephrology	3 months
Peripheral unit postings	4months
External Postings	2 months

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially and later to be performed under supervision followed by performing independently. Provision of skills laboratories for cardiopulmonary resuscitation in the medical colleges is mandatory.

**13. Assessment:** It is essential to monitor the learning progress of each candidate through

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Principal and Dean  
M.S. Ramaiah Medical College and Hospital  
M.S. Ramaiah University of Applied Sciences  
Bangalore-560054

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Dean - Academics  
Bangalore-560054



continuous appraisal and regular assessment. It not only also helps teachers to evaluate students, but also students to evaluate themselves. The monitoring will be done by the staff of the department based on participation of students in various teaching/learning activities.

### 1. **Formative Assessment:**

Formative assessment should be continual and should assess medical knowledge, patient care, procedure & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

### **Periodic Evaluation:**

Trainees will be evaluated continuously for their performance in all areas such as clinical and investigative work, case presentations, seminars, journal clubs, procedures etc. Additional periodic assessment will include theory and practical assessment mimicking the final examination should be conducted every 12 months. Such an evaluation will help assessing the progress of the trainees and the quality of the training programme. Evaluation will be communicated to trainees and their feedback would be taken into consideration for modifications in training programme.

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills.

### **Quarterly assessment during the DM training should be based on:**

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self-directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs



### 2. **Summative Assessment:**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The summative assessment examination shall include two heads:

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A. Theory examination.

B. Practical, Clinical examination and Viva-voce.

- Theory examination and Practical/Clinical, Viva-voce shall be separate heads of passing.
- Theory examination shall comprise of four papers. Passing percentage shall be cumulatively 50% with minimum of 40% marks in each theory paper.
- Practical /Clinical examination consist one long case, three short cases and viva-voce. Passing percentage shall be 50%.
- Passing shall be separate for each head and failing shall be common, meaning thereby that clearance at theory and failure at practical / clinical shall amount to failure at Summative examination and vice versa.



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Principal and Dean

M.S. Ramalah Medical College and Hospital

M.S. Ramalah University of Applied Sciences  
Bangalore-560054

H. L. Y. Rao

Dean - Academics

M.S. Ramalah University of Applied Sciences  
Bangalore-560054

**Scheme of Examination:**

A.

**Theory (Written Paper) 400 marks**

There shall be four question papers, each of three hours' duration. Each paper shall consist of 10 short essay questions each carrying 10 marks. Total marks for each paper will be 100. Questions on recent advances may be asked in any or all the papers. Details of distribution of topics for each paper will be as follows.

Name of the course	Course Code	Topics	Marks
Basic Medical Sciences related to Nephrology	DMC517A	Applied Anatomy, Pathology, Physiology, Pharmacology	100
Clinical Nephrology	DMC518A	Glomerular, tubular disorders, Hypertension	100
Hemodialysis, Peritoneal Dialysis, Renal transplantation	DMC519A	Principles and Practice of Hemodialysis, Peritoneal dialysis and Renal transplantation.	100
Research methods, Recent Advances and Interventional Nephrology.	DMC520A	Recent Developments in Nephrology	100

The practical examination should consist of the following:

1. One long case: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.
2. Two short cases from various sections of the specialty.
3. Ward rounds (including HD machine, CAPD apparatus and vascular access surveillance)
4. Stations for histopathology slide interpretation, specimens related to Nephrology, instruments, research methodology and discussion about student projects
5. Log Book Records and day-to-day observation during the training

**A. Total Marks Distribution:**

Maximum marks for	Theory	Practical	Viva	Grand Total
D M degree course	400	200	100	700



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Principal and Dean  
M.S. Ramaiah Medical College and Hospital  
M.S. Ramaiah University of Applied Sciences  
Bangalore-560054

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Bangalore-560054

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Annexures

Annexure 1\_ Competency List

Annexure 2\_ Course Plan

Annexure 3 \_ Students appraisal form

*Shalini*

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M.S. Ramaiah Medical College and Hospital

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Annexure 1Competency List

- Following is the table where you will find the details
- Idea is to teach, assess in an on-going manner and document.
- K/S/A refers to Knowledge/skill/affective domain and what is mentioned is the predominant domain to gain that particular competency

Topic	Competency	K/S/A predominant and must know (M),	Teaching Method	Assessment	Remarks	Doctor Signature
Temporary HD catheter Placement	a. Positioning the patient b. Identifying the Vein / Artery c. Insertion of Guidewire by USG Guidance d. Placement of HD catheter	S/M	DOAP	OMP		
Permanent HD catheter Placement	a. Positioning the patient b. Identifying the Vein / Artery c. Insertion of Guidewire by USG Guidance d. Confirmation by C ARM e. Creation of Tunnel F. Placement of HD	S/M	DOAP	OMP		



	catheter					
CAPD catheter Placement	a. Positioning the patient b. Identifying the Site of catheter insertion. c. Insertion of Guidewire. d. Confirmation by C ARM e. Insertion of CAPD catheter. f. Creation of Tunnel	S/M	DOAP	OMP		
Renal Biopsy	a. Positioning the patient b. Identifying the Site for biopsy c. Biopsy under USG guidance	S/M	DOAP	OMP		



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Principal and Dean

M.S. Ramaiah Medical College and Hospital  
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Bangalore-560054

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M.S. Ramaiah University of Applied Sciences  
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**Annexure 2.1**

	ACADEMICS/RESEARCH/PROFESSIONALISM
<b>1<sup>st</sup> year</b>	<ol style="list-style-type: none"> <li>1. Ward, OPD and Clinical work</li> <li>2. Start Journal clubs and seminars</li> <li>3. Attend the PG research methodology training programme and mandatory to complete MCI /NMC prescribed online research methodology course</li> <li>4. Attend the Post graduate Medical education training program (PG MET)</li> <li>5. Maintain logbook entry of all activities</li> <li>6. Internal assessment I - theory, practical &amp; viva voce</li> <li>7. Begin review and data collection for research</li> <li>8. Attend CME/Conferences/training Workshops</li> <li>9. Submission of 1st year logbook to HOD for signature</li> <li>10. Preparation for Poster/Oral Presentation in State /National conference /International Conference</li> </ol>
<b>2<sup>ND</sup> year</b>	<ol style="list-style-type: none"> <li>1. Continue academic activities as per syllabus</li> <li>2. Plan for rotational postings</li> <li>3. Continue Journal club and seminars</li> <li>4. Complete record book</li> <li>5. An oral / poster presentation in State / National conference / international conference</li> <li>6. Submission of logbook entry to HOD signature with all entries of the teaching learning methods and training programmes</li> <li>7. Internal assessment II – both theory, practical and viva voce</li> <li>8. Feedback from Guide and HOD</li> </ol>
<b>3<sup>rd</sup> year</b>	<ol style="list-style-type: none"> <li>1. Continue academic activities as per syllabus</li> <li>2. Continue teaching of Undergraduate medical students</li> <li>3. Complete research work</li> <li>4. Presentation of research work</li> <li>5. Complete logbook entries</li> <li>6. Practice pedagogy sessions</li> <li>7. Preliminary examination (III IA– theory, practical and viva voce) three months prior to university examination</li> <li>8. Feedback from Guide and HOD</li> </ol>



Shalini  
Principal and Dean  
Approved by the academic council at its 27<sup>th</sup> meeting held on 27 September 2022  
M.S. Ramalah Medical College and Hospital  
M.S. Ramalah University of Applied Sciences  
Bangalore-560054

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Annexure 2.2**PG TEACHING PROGRAMME FOR THE MONTH OF September 2023**

DATE	TOPIC	PRESENTER	MODERATOR
01/09/2023	DNB Exams		
04/09/2023	Case Presentation	Dr Akshay	Dr Mahesh
06/09/2023	Dermatological manifestations of kidney disease	Dr Siddanth	Dr Rajashekar
8/09/2023	Tropical kidney diseases	Dr Anusha	Dr Hamsa
11/09/2023	Case Presentation	Dr Rahul	Dr Gireesh
13/09/2023	IV Fluids in Critical care	Dr Baseer	Dr Yusuf
15/09/2023	Journal	Dr Sadhana	Dr Hamsa
18/09/2023	Case Presentation	Dr Rakesh	Dr Mahesh
20/09/2023	Review article	Dr Sourabh	Dr Mahesh
22/09/2023	Hepatorenal Syndrome	Dr Spoorthi	Dr Rajashekar
25/09/2023	Case Presentation	Dr Anusha	Dr Gireesh
27/09/2023	Dialyzers and Reuse	Dr Surendra	Dr Pooja
29/09/2023	Infection Related Glomerulonephritis	Dr Rakesh	Dr Gireesh

## Instructions: -

- All classes will be based on discussion
- Both students should discuss with each other prior to the class and present
- The team shall discuss with the teacher atleast 3-5days before the date of the class.
- The week's doubts clarifications to be discussed with the faculty on Saturdays.
- All the best

*Registrar*  
M.S.Ramaiah University of Applied Sciences  
Bangalore - 550 054

*Shalini*

Principal and Dean  
M.S. Ramaiah Medical College and Hospital  
M.S. Ramaiah University of Applied Sciences  
Bangalore-560054

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**ANNEXURE – 2.3**  
**DEPARTMENT OF NEPHROLOGY**  
**POLICY FOR OUTSIDE PG POSTINGS**

1.2<sup>nd</sup> year students are posted for 1 month each in the Department of Nephrology in SVIMS, Tirupathi – for PD Exposure and Department of Nephrology, SGPGI, Lucknow for ABOi KT exposure.

**Annexure 2.4**  
**LOGBOOK ENTRY**

Date	
Setting/method	
Presented/attended	
Summary in brief	
Reflection	
Teachers comments	

Student's signature



Guide's Signature

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ANNEXURE-3

Postgraduate Students Appraisal Form Name of the PG Student \_\_\_\_\_ Period of Training Duration:.....to.....

Sl. No	Particulars	Not satisfactory (1,2,3)	Satisfactory (4,5,6)	More than Satisfactory (7,8,9,10)	Remarks
1	Journal based learning				
2	Patient care and rounds				
3.	Bedside teaching, Clinical seminars				
4.	Communication skills				
5.	Log book				
6.	CME/Outreach programmes/Conference presentations				
7.	Self-directed learning				
8.	Under-graduate teaching				
9.	Research/Publication				

Sign of the student

Sign of the assessor

Sign of Head of the Department



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 M.S. Ramaiah University of Applied Sciences  
 Bangalore-560054

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## Course Specifications

### DM Nephrology 2022 onwards

Course Code: DMC517A



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Course Specifications

Course Title	Basic Medical Sciences related to Nephrology
Course Code	DMC517A
Department	Nephrology
Faculty	Ramaiah Medical College

Course summary:

This course is designed in such a way that the student will master the basics of Nephrology with applied aspects of Anatomy, Physiology, Pathology and Pharmacology.

Course Outcomes:

**CO 1:** Demonstrate comprehensive knowledge of applied anatomy and Physiology in Nephrology. Classification, histopathology, investigations and Pharmacology.

**CO 2:** Demonstrate the understanding of various Classification, histopathology concepts and their application in Management of renal diseases.

**CO 3:** Demonstrate the understanding of Pharmacokinetics and pharmacodynamics of various drugs and their use in Renal diseases and Transplantation.

Course Content

## BASIC SCIENCES RELATED TO NEPHROLOGY

Embryology of the kidney

Anatomy of the kidney

Renal histology

Renal circulation &amp; microcirculation

Estimation of Glomerular Filtration Rate (GFR)

Solute transport - Both organic and inorganic

Renal Acidification

Urine Concentration &amp; Dilution

Disorders of water metabolism

Electrolyte and acid base disorders

Approach to Renal Tubular Acidosis

Role of kidney in blood pressure regulation

Endocrine and autocrine function of the kidney

Urinalysis

Imaging in renal disease

Renal biopsy- Procedure and interpretation of slides

Stains in renal histology

Light microscopy, Immunofluorescence and electron microscopy

Pathogenesis of renal diseases and renal histopathology

Immunological investigation of renal disease

Animal models in kidney diseases

Handling of drugs in kidney disease

Renal dose adjustments

Diuretics and their mechanisms of action

Systemic cancer therapies and the kidney

Immunosuppressive drugs in transplant scenario



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Course Mapping (CO-PO-PSO Mapping)CO- PO Mapping

Course Code and name	Course outcomes	Program Objectives					
		PO1	PO2	PO3	PO4	PO5	PO6
DMC517A Basic Medical Sciences related to Nephrology	CO1	3	1	1	3	2	1
	CO2	2	1	1	3	1	1
	CO3	3	1	1	2	2	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution							

CO- PSO Mapping

Course Code and name	Course outcomes	Program Specific outcomes								
		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
DMC517A Basic Medical Sciences related to Nephrology	CO1	3	3	3	3	2	1	1	2	1
	CO2	2	3	3	2	2	1	1	2	1
	CO3	3	2	2	3	2	1	1	2	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution										



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## Course Specifications

### DM Nephrology 2022 onwards

Course Code: DMC518A



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Course Specifications

Course Title	Clinical Nephrology
Course Code	DMC518A
Department	Nephrology
Faculty	Ramaiah Medical College

Course Summary:

This course is designed in such a way that the student will master the evidence based management of Clinical Nephrology.

Course Outcomes:

**CO 1:** Demonstrate etic-pathogenesis and management of glomerulo-tubular renal disorders. (C,A)

**CO 2:** Demonstrate etic-pathogenesis and management of Hypertension, UTI and Nephrolithiasis. (C,A)

**CO 3:** Demonstrate etic- pathogenesis and management of Pediatric and inherited renal diseases. (C,A)

Course Content:**1. GLOMERULAR DISEASE – Definitions, Pathogenesis, Diagnosis & Management**

Renal syndromes

Nephrotic syndrome - Complications

Minimal change disease

Focal segmental glomerulosclerosis

Inherited causes of nephritic syndrome

Immunoglobulin A nephropathy and Henoch- Schönlein purpura

Membranous nephropathy

Mesangiocapillary glomerulonephritis

Glomerulonephritis associated with complement disorders

Lupus nephritis

Crescentic glomerulonephritis

Anti glomerular basement membrane (Goodpasture's) disease

Renal vasculitis

Infection- related glomerulonephritis

Malignancy- associated glomerular disease

Glomerular disease in the tropics

Renal amyloidosis

Thrombotic microangiopathy



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**2.THE KIDNEY IN SYSTEMIC DISEASE - Approach, Diagnosis & Management**

Diabetes mellitus  
Amyloid and immunotactoid glomerulopathy  
Plasma cell dyscrasias  
Sarcoidosis  
Systemic vasculitis  
Mixed cryoglobulinemias and hepatitis C infection  
Scleroderma- systemic sclerosis  
Rheumatoid arthritis  
Sickle cell nephropathy  
Cancer and the kidney

**3.TUBULOINTERSTITIAL DISEASE - Approach, Diagnosis & Management**

Acute Tubular Injury  
Acute Interstitial Nephritis  
Isolated defects of tubular function Fanconi syndrome  
Renal tubular acidosis  
Nephrogenic diabetes insipidus  
Autosomal Dominant Tubulointerstitial Kidney Disease (ADTKD)  
IgG4 Related kidney disease  
Analgesic nephropathy  
Nonsteroidal anti- inflammatory drugs and the kidney  
Nephrotoxic metals- lithium  
Balkan nephropathy  
Aristolochic acid nephropathy  
Myeloma kidney

**4.HYPERTENSION**

Normal Blood Pressure control and evaluation of hypertension  
Primary hypertension  
Non pharmacologic prevention  
Treatment of hypertension  
Renovascular hypertension and ischemic nephropathy



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Renal artery stenosis – Clinical features, evaluation and management

#### 5. PREGNANCY AND RENAL DISEASE

Physiologic changes in pregnancy

Pregnancy with preexisting kidney disease

HD in pregnancy

Urinary tract infection in pregnancy

#### 6. INFECTIOUS DISEASES - Approach, Diagnosis & Management

Lower and upper urinary tract infection in adults

Urinary tract infection in children

Renal tuberculosis or other mycobacterial infections

Fungal infections and the kidney

HIV and the kidney

Graft pyelonephritis

#### 7. RENAL STONE DISEASE

Types of stones

Nephrolithiasis and nephrocalcinosis

24 hour urine collection analysis & stone Analysis

Medical management of stone disease

Surgical management of stone disease Nephrocalcinosis

Renal stone disease in children

#### 8. PEDIATRIC NEPHROLOGY

CAKUT- Congenital Anomalies of the urinary tract Hydronephrosis (HUN)

Hydroureter

Ureterocoele

Posterior urethral valves

Evaluation of antenatal HUN

Urinary tract infection (UTI) in infancy, childhood, adolescence

Renal dysplasia

Vesicoureteral reflux (VUR)

Neurogenic bladder

Enuresis in Children



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Juvenile nephronophthisis

Medullary sponge kidney

Dialysis – Modality selection, Issues in children

Transplant in children and issues related to children and adolescents

## 9. INHERITED RENAL DISEASE

Investigation of inherited renal disease

Autosomal dominant polycystic kidney disease

Other cystic kidney diseases

Fanconi syndrome

Nephronophthisis

Alport's syndrome

Primary hyperoxalurias

Genetic testing in Nephrology

*Ge*  
Registrar  
M.S. Ramalah University of Applied Sciences  
Bangalore - 560 054

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*Shalini*  
Principal and Dean  
M.S. Ramalah Medical College  
M.S. Ramalah University of Applied Sciences  
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Course Mapping (CO-PO-PSO Mapping)Co- PO Mapping

Course Code and name	Course outcomes	Program Objectives					
		PO1	PO2	PO3	PO4	PO5	PO6
DMC518A Clinical Nephrology	CO1	3	1	1	3	2	1
	CO2	2	1	1	3	1	1
	CO3	3	1	1	2	2	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution							

CO- PSO Mapping

Course Code and name	Course outcomes	Program Specific outcomes								
		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
DMC518A Clinical Nephrology	CO1	3	3	3	3	2	1	1	2	1
	CO2	2	3	3	2	2	1	1	2	1
	CO3	3	2	2	3	2	1	1	2	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution										



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## Course Specifications

### DM Nephrology 2022 onwards

Course Code: DMC519A



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Course Specifications

Course Title	Hemodialysis, Peritoneal Dialysis, Renal transplantation
Course Code	DMC519A
Department	Nephrology
Faculty	Medicine

Course Summary:

The course is designed in such a way that the student will master multidisciplinary management of cancer in addition to palliative care.

Course Outcomes:

**CO1:** Demonstrate etiopathogenesis, Management and Complications of Acute Kidney injury and Chronic Kidney Disease.(C,A)

**CO2:** Demonstrate Practice and principles of Hemodialysis and Peritoneal dialysis. (C,A,P)

**CO3:** Demonstrate Practice and principles of Renal Transplantation. (C,A)

Course Content:

1. A. ACUTE KIDNEY INJURY (AKI) - Definitions, Pathogenesis, Diagnosis & Management
  - Etiology
  - Definitions – RIFLE, AKIN, KDIGO
  - Ischemic AKI
  - Nephrotoxic AKI
  - Sepsis and AKI
  - AKI in tropical countries – Malaria, leptospirosis, snake bite envenomation
  - Cardiorenal syndromes
  - Pigment- induced AKI
  - Hepatorenal syndrome
  - AKI in infants and children
  - AKI in the elderly
  - Biomarkers in AKI
  - Onco-nephrology
2. CHRONIC KIDNEY DISEASE (CKD) - Definitions, Approach, Pathogenesis, Diagnosis & Management
  - Epidemiology of kidney disease
  - Risk factors of CKD
  - Nephron endowment
  - KDIGO definition of CKD
  - Sexual disorders in CKD



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Hypertension in CKD  
 Cardiovascular risk factors in CKD  
 Gastrointestinal disorders in CKD  
 Hematological disorders in CKD  
 CKD – Mineral bone disease  
 Immune function in CKD  
 Coagulation disorders in CKD  
 Dermatologic disorders in CKD  
 Neuropsychiatric disorders in CKD  
 Growth and endocrine disturbances in children with CKD  
 Aging and kidney disease  
 Geriatric nephrology  
 CKD u (chronic kidney disease of unknown etiology)

### 3. HEMODIALYSIS

Dialysis choices  
 Vascular access for HD  
 HD apparatus  
 Alarms in HD machine  
 Dialysate composition  
 HD – Principles and techniques  
 Acute HD prescription  
 Chronic HD prescription  
 Dialysis disequilibrium syndrome  
 Intradialytic complications  
 Continuous Renal Replacement Therapy (CRRT)  
 -Hemofiltration & hemodiafiltration  
 Urea Reduction Rate & Kt/V  
 Extracorporeal therapies for poisoning  
 Plasma exchange  
 Vascular access surveillance  
 Infection control practices in HD unit  
 Investigation of a dialysis outbreak  
 Reverse osmosis for HD unit

### 4. PERITONEAL DIALYSIS

CAPD apparatus  
 Peritoneal membrane and transporter status  
 Indications for PD and patient selection  
 Concept of residual renal function  
 CAPD catheter placement techniques  
 PD peritonitis  
 Inlet and outflow failure  
 Peritoneal Equilibrium Test  
 Initial PD prescription  
 Adequacy of dialysis  
 Long term complications of CAPD



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**5. RENAL TRANSPLANTATION**

Transplantation immunology

Living related and deceased donor renal transplant- Current practices and outcomes

Living donor evaluation

Renal recipient evaluation

Maintenance of brain dead donor

Cross match techniques and immunological workup before transplantation

The transplant procedure and perioperative management of the recipient

Immunosuppression protocols for renal transplantation

Delayed Graft Function

Medical & surgical complications following transplantation

Acute graft rejection – Cellular and Antibody mediated- Diagnosis & management

Banff classification for allograft rejection

Opportunistic infections- post transplant

Cardiovascular disease in post transplant patients

Chronic allograft injury

Recurrent disease in renal transplantation

Legal issues related to transplant- Human Organ Transplant Act (HOTA)

Transplant in special situations – HLA and ABO incompatibility

Combined liver - kidney transplantation

Kidney –pancreas transplantation/ Pancreas after kidney transplantation

Xenotransplantation



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Course Mapping (CO-PO-PSO Mapping)CO- PO Mapping

Course Code and name	Course outcomes	Program Objectives					
		PO1	PO2	PO3	PO4	PO5	PO6
DMC519A Hemodialysis, Peritoneal Dialysis, Renal transplantation	CO1	3	1	3	2	3	2
	CO2	2	1	3	3	2	1
	CO3	3	1	2	3	2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution							

CO-PSO Mapping

Course Code and name	Course outcomes	Program Specific outcomes								
		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
DMC519A Hemodialysis, Peritoneal Dialysis, Renal transplantation	CO1	3	3	2	2	3	1	1	2	2
	CO2	2	3	3	2	2	1	1	3	1
	CO3	3	3	2	3	2	1	1	2	2
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution										



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Course Specifications

Course Title	Research methods, Recent Advances and Interventional Nephrology
Course Code	DMC520A
Department	Nephrology
Faculty	Ramaiah Medical College

Course Summary:

The course is designed in such a way that the student will master recent developments in oncology, research in oncology and cancer control programmes.

Course Outcomes:

CO 1: Demonstrate principles and application of Biostatistics. (C)

CO 2: Knowledge regarding recent advances in the field of Nephrology. (C)

CO 3: Principles and practice of Interventional Nephrology. (C, A,P)

Course Content:**I. RECENT ADVANCES**

Biostatistics and clinical epidemiology

Research methodology

Artificial and bioartificial kidney

Online hemodiafiltration

Sorbent dialysis

HD machine and dialyzers (Innovations from India)

Newer therapeutic molecules in the field of Nephrology and Transplantation

Palliative nephrology



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Course Mapping (CO-PO-PSO Mapping)CO- PO-Mapping

Course Code and name	Course outcomes	Program Objectives					
		PO1	PO2	PO3	PO4	PO5	PO6
DMC520A Research methods, Recent Advances and Interventional Nephrology	CO1	2	1	1	3	1	2
	CO2	2	1	1	2	1	2
	CO3	3	1	1	3	2	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution							

CO- PSO Mapping

Course Code and name	Course outcomes	Program Specific outcomes								
		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
DMC520A Research methods, Recent Advances and Interventional Nephrology	CO1	3	3	3	3	2	1	1	2	2
	CO2	2	3	3	2	2	1	1	2	1
	CO3	3	2	2	3	2	1	1	2	1
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution										

  
 Registrar  
 M.S. Ramaiah University of Applied Sciences  
 Bangalore - 560 054

  
 Dean - Academics  
 M.S. Ramaiah University of Applied Sciences  
 Bangalore - 560 054

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 Bangalore - 560 054

## Course Materials

### Recommended Books and Journals

#### Text books (latest edition):

1. Disease of the Kidney and Urinary tract; Robert W Schrier (8th edition)
2. Comprehensive Clinical Nephrology; John Feehally (6th edition)
3. The Kidney; Brenner & Rector (11th edition)
4. Oxford Textbook of Clinical Nephrology; Neil Turner, et al (4th edition)
5. Handbook of Dialysis; John. T Daugirdas (5th edition)
6. Manual of Nephrology; Robert.W. Schrier (8th edition)
7. Handbook of Kidney Transplantation; Gabriel. M. Danovitch (6 th edition)
8. Kidney Transplantation- Principles and practice; Peter J. Morris (7th edition)
9. Fundamentals of Renal Pathology; Agnes B. Fogo (2nd edition)

#### Journals:

1. Kidney International
2. American Journal of Kidney Disease
3. Journal of American Society of Nephrology
4. Clinical Journal of the American Society of Nephrology
5. Transplantation
6. Transplant International
7. Seminars in Nephrology
8. Nephrology Dialysis Transplantation
9. Clinical Kidney Journal
10. Hemodialysis International
11. Indian Journal of Nephrology



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M. L. Y. Rao  
Dean - Academics  
M.S. Ramaiah University of Applied Sciences

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