School of Allied Health Professions

History

The School of Allied Health Professions was established at Virginia Commonwealth University's Medical College of Virginia Campus on Jan. 1, 1969.

A fundamental reason for the establishment of the School of Allied Health Professions was to provide an administrative structure for existing educational programs in allied health disciplines and to direct the development of new programs in response to the growing need for allied health manpower. At the outset, the school incorporated existing educational programs for hospital administration, medical technology, physical therapy, radiologic technology and X-ray technicians. A program for nurse anesthesia was inaugurated as a separate department in 1969; an existing educational program in occupational therapy located on the Academic Campus was transferred administratively to the School of Allied Health Professions in 1970; also in 1970, a teaching program in patient counseling formerly based within MCV Hospitals was integrated with the school. Since 1974, a baccalaureate program in radiation sciences, with specific concentrations in education and in administration, has been established. A Ph.D. program in health services, organization and research, the first doctoral program for the School of Allied Health Professions, was introduced in 1982. In 1985, the existing Department of Gerontology was transferred administratively to the School of Allied Health Professions. In June 1988, an executive master's program in health administration was introduced. An entry-level master's degree professional program in physical therapy was initiated for students matriculating in August 1989. In 1995, the Department of Rehabilitation Counseling was transferred to the School of Allied Health Professions from the School of Community and Public Affairs. An interdisciplinary, distance-learning doctoral program, the Ph.D. in Health Related Sciences, began in fall 1998. Recent program developments include the initiation of an entry-level master's degree program in occupational therapy and the subsequent closure of their undergraduate program (1998); the initiation of a master of science degree offering in the Department of Patient Counseling (2000); and the start of a joint-degree program, the M.D./M.H.A., offered by the Department of Health Administration and the School of Medicine (2001).

Programs

Departments and programs currently in this school and the degrees or certificates conferred on their graduates are:

School of Allied Health Professions
- Doctor of Philosophy in Health Related Sciences

Department of Clinical Laboratory Sciences
- Bachelor of Science
- Master of Science

Department of Gerontology
- Master of Science
- Postgraduate Certificate in Aging Studies
- Postgraduate Certificate in Aging Studies and Master of Social Work – offered in conjunction with the School of Social Work
- Postgraduate Certificate in Aging Studies and Master of Science in Rehabilitation Counseling

Department of Health Administration
- Master of Health Administration
- Master of Health Administration/Juris Doctorate – offered jointly with the T. C. Williams School of Law at the University of Richmond
- Master of Health Administration/M.D.
- Professional Master of Science in Health Administration Online Program
- Doctor of Philosophy in Health Services, Organization, and Research

Department of Nurse Anesthesia
- Master of Science in Nurse Anesthesia

Department of Occupational Therapy
- Master of Science in Occupational Therapy
- Master of Science

Program in Patient Counseling
- Post-baccalaureate Certificate in Patient Counseling
- Master of Science

Department of Physical Therapy
- Master of Science
- Doctor of Philosophy – Physical Therapy track offered in conjunction with the departments of Anatomy and Physiology, School of Medicine
- Doctor of Physical Therapy

Department of Radiation Sciences
- Bachelor of Science

Department of Rehabilitation Counseling
- Master of Science
- Post-master's Certificate in Professional Counseling

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Professor and Dean (1993)
B.S.N. 1976 University of Arizona
M.S. 1980 University of Arizona
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Associate Professor and Associate Dean (1988)
B.A. 1970 Mount Saint Joseph
M.A. 1979 Ohio State University
M.S. 1981 Rush University
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Stephen C. Harvey
Assistant Professor and Assistant Dean (1977)
B.S. 1970 Virginia Commonwealth University
M.Ed. 1975 Virginia Commonwealth University

Debra A. Ropelewski
Assistant Dean (1983)
B.S. 1982 Virginia Polytechnic Institute and State University
M.B.A. 1988 Virginia Commonwealth University

Jeffrey R. Lodge
Director of Information Systems (1992)
B.A. 1987 Emory and Henry College

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Detailed descriptions of all graduate and professional programs may be found in the Graduate and Professional Programs Bulletin.

Philosophy

The faculty of the school is committed to offer, through the establishment and maintenance of rigorous standards of excellence, undergraduate, graduate and professional education that will prepare students for careers in several allied health disciplines. Development of professional attitudes, emotional maturity and ethical behavior are vital components of the educational process. It is essential that students gain a deep respect for the dignity of man and the inherent rights of patients and others who receive services. Programs are designed to include not only the development of skills to assure excellence in quality of health care, but also such factual knowledge and experiences that will provide the basis for continuing intellectual and professional growth.

Community services of the school and faculty include continuing education, consultative resources and participation in all pertinent areas of health care. An integral part of these efforts is to stimulate and sponsor research activities in the allied health disciplines represented within the school and to encourage interdisciplinary research.

Facilities

Departments and programs in the School of Allied Health Professions are housed in the Randolph-Minor Annex, West Hospital, Newton House, VMI Building, Lyons Building, Grant House, Samuel Putney House and McGuire Hall.

Accreditation

VCU and its component schools are accredited by the Southern Association of Colleges and Schools, the general accrediting agency for colleges in the region. The School of Allied Health Professions is an institutional member of the American Society of Allied Health Professions and the Virginia Association of Allied Health Professions. All of its programs are approved or accredited by the appropriate national professional or educational organizations.

Licensure/accreditation

Graduates of most of the programs offered in the School of Allied Health Professions are required or eligible to take national/state certification of licensure examinations. Requirements of licensing and certifying agencies vary. Some licensure and certification agencies consider individuals convicted of a felony ineligible for licensure or certification. For specific information, prospective students should contact the licensure or certification agency for their allied health disciplines.

Student performance and behavior

The goals and objectives of the School of Allied Health Professions and its component departments and programs relate to the education of persons preparing for professional careers in the allied health disciplines. An integral requisite of each student and practitioner is an undeviating acceptance of a professional attitude and pride that will motivate him/her to adhere to a code of professional ethics and to develop fully the competencies for practice.

Thus, the suitability of student performance and behavior relating to these professions and to the consumers of health care is a paramount concern of the administration and faculty of this school. Standards of conduct are presented in the Division of Student Affairs chapter of this bulletin and relate to the students in the School of Allied Health Professions. To assure a quality of educational and clinical preparation for its graduates, the following statement also is promulgated:

> If, in the judgment of the faculty/administration of the School of Allied Health Professions, a student is not considered suitable for emotional, professional or related reasons, the student's academic status may be appropriately altered.
>
> If questions arise regarding standards of performance or behavior, it is the responsibility of students to apprise themselves of acceptable character and conduct requirements prior to matriculation in the designated department or program.

Attendance regulations

The faculty considers attendance at lectures, laboratories and other functions a requisite to the successful acquisition of the knowledge and skills required of the professional. The faculty cannot condone absence without good reason from any regularly scheduled educational experience. At the start of each course, the instructor will relate to the class the policy of his or her department concerning attendance regulations for that semester. The nature of make-up work in the event of absence will be the prerogative of the instructor.

Graduate programs

Graduate degree offerings in the School of Allied Health Professions are designated as basic professional or advanced-level programs. Accreditation requirements for the individual programs preclude the establishment of general school admission prerequisites, registration dates, and course and degree requirements. All programs eligible for accreditation are fully accredited by their respective agencies. Refer to the Graduate and Professional Programs Bulletin for more information.

Master of Science in Clinical Laboratory Sciences Program

Two graduate level tracks in clinical laboratory sciences are offered. The advanced master's track is designed for students holding a baccalaureate degree in clinical laboratory science (medical technology) and a generalist certification. Candidates may specialize and complete a project or thesis in clinical chemistry, hematology, microbiology, immunohematology or immunology. In addition to the basic science requirement, each student will choose an area of secondary emphasis in biomedical research, education, management or business. The categorical master's track in clinical laboratory sciences is designed for students with a baccalaureate degree in biology or chemistry. This option provides specialized study including a clinical practicum in one of the following areas: clinical chemistry, hematology, microbiology or immunohematology. A project or thesis is required. Upon completion of the program, students are eligible to take a national certification examination in the area in which they performed their concentrated study.

Master of Science in Gerontology Program

The graduate degree program in gerontology prepares individuals for careers involving work with the elderly at the national, state and local levels. The curriculum is designed to provide knowledge for those interested in administration, planning, service delivery and instructional/staff development. A certificate in aging studies

and a long-term care certificate in aging studies also are offered.

Graduate programs in health administration

The Master of Health Administration (M.H.A.) program is designed to provide advanced educational preparation in the direction and management of health-care organizations. In conjunction with the M.H.A. program, a joint M.H.A./Juris Doctor (M.H.A./J.D.) is offered with the University of Richmond's T. C. Williams School of Law. Another joint degree program, the M.D./M.H.A., is offered in conjunction with VCU's School of Medicine. The Professional Master of Science in Health Administration (M.S.H.A.), Online Program is designed to provide management preparation for practitioners with five or more years of health care experience. The M.S.H.A. program requires 44 credit hours taken mainly through distance learning and six one-week on-campus sessions over the two years needed for completion. The Ph.D. in Health Services Organization and Research program that prepares individuals for positions as faculty, researchers, policy analysts and top-level staff in complex health organizations.

Master of Science in Nurse Anesthesia Program

This graduate degree program in nurse anesthesia is designed to prepare the baccalaureate-educated nurse for entry into practice as a nurse anesthetist. The curriculum combines course work in the basic sciences, the advanced practice of nurse anesthesia and practical skills gained through clinical practica. The program maintains as its primary objective the graduation of superb clinical specialists.

Graduate programs in occupational therapy

The entry-level Master of Science in Occupational Therapy Program is a professional program designed for students who wish to become occupational therapists. Applications will be accepted from students who have completed at least three years of baccalaureate course work. An advanced Master of Science Program is offered for those who are registered occupational therapists. This post-professional program is designed individually in special areas of concentration.

Graduate program in patient counseling

The Program of Patient Counseling offers graduate education at the master's and certificate levels designed to assist individuals to work in the health-care field in dealing with the whole person in the conflict of life's crises. It promotes the importance of educating qualified persons to address the human dimensions of illness. Patient counseling is the practice of communicating empathetic concern, support and sensitive spiritual counsel to the physically or emotionally troubled person in the traumas of life. Patient counseling emphasizes a systems perspective on care, both in promoting an interprofessional team approach and in understanding counseling assessment/intervention within the context of family as well as social systems. It is offered to persons who have an existing identity in a helping or counseling profession. This includes clergy, social workers, institutional counselors, education specialists, psychologists, community health workers and others in the health-care professions.

Graduate programs in physical therapy

A three-year professional education program, the Doctor of Physical Therapy program, serves as an entrance into the profession. The goal of this program is to prepare physical therapists that have the basic skills, knowledge and attitudes to function effectively in the multifaceted role of a physical therapist. Prerequisites for admission to the program include a bachelor of arts or science degree from an accredited college or university. Students who have completed the program earn a doctor of physical therapy degree and are eligible for the physical therapy licensure exam. The Advanced Graduate (post-professional) Master of Science program is designed for persons who have completed their physical therapy education. Two specialization tracks, musculoskeletal and neurologic, are offered. The objective of this program is to educate physical therapists in research, education and clinical problem-solving skills so that they will be the clinical and academic researchers and teachers of the future. A Doctor of Philosophy program, offered in conjunction with the departments of Anatomy and Neurobiology, and Physiology in the School of Medicine, is offered to train students in research and education skills in preparation for the students to function as physical therapy faculty members. The Department of Physical Therapy participates with other departments in the School of Allied Health Professions in offering a Doctor of Philosophy in Health Related Sciences program. This program is an innovative, distance-learning course of doctoral study and is described in the Graduate and Professional Programs Bulletin.

Master of Science in Rehabilitation Counseling

The master's degree program in rehabilitation counseling prepares students to become certified rehabilitation counselors who provide direct professional service and administrative leadership in agencies and organizations involved with mental and physical disabilities. Admission is based on an applicant's suitability for a career in rehabilitation counseling and other factors such as emotional maturity, previous work experience, scholarship, recommendations and a personal interview. The advanced certificate in professional counseling is designed to help students fulfill the post-master's requirements for the licensed professional counselor credentials in Virginia and other states. The additional training also helps students to achieve national certification in such counseling specialties as rehabilitation, mental health, marriage and family, and alcohol and drug abuse.

Doctoral Program in Health Related Sciences

The Ph.D. Program in Health Related Sciences is an innovative distance-learning course of doctoral study designed for the mature and experienced professional seeking doctoral education for continued career advancement in the allied health professions. The program was designed with the cooperation and commitment of the nine departments in the School of Allied Health Professions to meet the critical need for doctoral-prepared faculty and researchers. The program involves a four year course of study divided into two semesters per year, and composed of both on- and off-campus sessions. The 57-credit curriculum is divided into a common interdisciplinary core, a research methods core, specialty track courses and dissertation research. To be considered for admission, applicants must hold a master's degree from an approved institution of higher learning.

It is the intent that the regulations and procedures for each program ensure the selection of applicants whose motivation,

ability, character and health status qualify them to successfully pursue graduate study. Specific information may be found in the Graduate and Professional Programs Bulletin or is available from the departmental graduate coordinator. Information also is available on the VCU School of Graduate Studies home page under the School of Allied Health Professions link: www.vcu.edu/gradweb/programs.html.

Courses in allied health professions (ALHP)

ALHP 391 Special Topics
Semester course; 1-4 credits. Prerequisite: Permission of instructor. Offered for undergraduate level. Interdisciplinary study through lectures, tutorial study or independent research of selected topics not provided in other courses.

ALHP 401 Instructional Strategies
Semester course; 3 lecture hours. 3 credits. This course is designed to introduce the student to learning theory, instructional design, evaluation and methodology. Emphasis will be placed on the study of applying principles and techniques of teaching in all areas of allied health education.

ALHP 425 Economics of Health Care
Semester course; 4 credits. Examines the topic of economics as it affects the field of health information management. Approaches broad economic and financial concepts as applied to policy making in the healthcare industry. Emphasizes the budget process in healthcare institutions as it affects individual departments and how it requires accountability of each.

ALHP 594 Health Education Practicum
Semester course; 1 lecture and 4 laboratory hours. 1-6 credits. Prerequisite: ALHP 573. Preparation, presentation and evaluation of selected educational experiences in the appropriate graduate program. Section 01: General; Section 02: Nurse Anesthesia; Section 03: Clinical Laboratory Sciences.

ALHP 596 Supervisory and Administrative Practicum in Allied Health Clinics
Semester course; 60 clinical hours per credit. 1-9 credits. Prerequisite: Permission of instructor. The course is designed for the student who will be assuming supervisory and administrative roles. Areas to be covered include clinical personnel management, budgeting and ordering of materials and equipment, consultation with physicians, developing and troubleshooting clinical methods, designing job descriptions and implementation of quality control programs. Section 01: Clinical Laboratory Sciences Section 02: Physical Therapy.

Department of Clinical Laboratory Sciences

Barbara J. Lindsey
Associate Professor and Department Chair (1975)
R.T. 1971 Mohawk College
M.S. 1977 Virginia Commonwealth University

Nadder, Teresa S. (1983) Associate Professor and Assistant Department Chair
B.S. 1978 Virginia Commonwealth University
M.S. 1989 Virginia Commonwealth University
Ph.D. 1998 Virginia Commonwealth University

Korzum, William J. (2002) Associate Professor
B.S. 1973 Rutgers University
M.S. 1978 Temple University
Ph.D. 1988 Virginia Commonwealth University

Prentice, Katherine A. (1969) Assistant Professor
B.S. 1963 Medical College of Virginia
M.A. 1977 Central Michigan University

Sauer, Ronald L. (1978) Associate Professor
A.A. 1968 American River College
B.A. 1970 California State University
M.A. 1972 University of California

Adjunct faculty
Frank E. Einsmann
Deborah D. Sauer

Medical adviser
Richard A. McPherson, Professor, Department of Pathology

History

Clinical laboratory scientists have been trained at the Medical College of Virginia Campus since 1927. However, the Department (formerly school) of Medical Technology was not formally established until 1952 at which time the curriculum included six months of didactic experience with lectures and laboratory sessions held in the department, followed by a six-month rotation through the clinical laboratories. The school offered a certificate and/or degree program which met the requirements of the American Medical Association as implemented through the Board of Schools of the American Society of Clinical Pathologists (ASCP). In 1961-62 the certificate program was discontinued, and all students accepted were required to have previously completed 90 semester hours which included medical technology prerequisites. Upon completion of the course, the students were awarded a bachelor of science degree.

Beginning with the 1974 fall semester, the curriculum was expanded to the current two-year program. Students must have completed 60 semester hours, including medical technology prerequisites, before entrance into the baccalaureate program.

The graduate program in clinical laboratory sciences was started in 1967 to provide advanced education for certified medical technologists/clinical laboratory scientists.

In 1981 the program was modified to accept part-time students and in 1985 to allow candidates holding a degree in another area of science to obtain graduate education in clinical laboratory sciences.

In 1994, the department name was changed to the Department of Clinical Laboratory Sciences.

Mission

The Department of Clinical Laboratory Sciences, in concord with the mission statements of the School of Allied Health Professions and the university, provides an environment that nurtures excellence in education, research and service.

The department provides the student with superior studies in clinical laboratory science, including both theoretical and applied clinical education, and develops problem-solving expertise, leadership capabilities and communication skills. A mature, responsible approach to the acquisition of knowledge is cultivated in order to establish the student's continued intellectual growth and enthusiasm for the profession. The department fosters fair and equitable educational experiences for students of all ages and diverse backgrounds. Strong affiliations with clinical educators and the integration of innovative technology in the academic setting facilitate both the education and research goals of the department.

The department meets the growing health-care needs of the community by providing highly competent and professional clinical laboratory scientists who will be able to function effectively upon entrance into the field and be prepared to explore future scientific and technological advances in laboratory science.

The department promotes continued professional development and personal growth for the faculty and staff to fulfill and balance the individual's abilities and aspirations with the departmental, school and institutional mission and needs. Members of the department conduct themselves in a forthright manner and practice the highest standard of quality performance.

Objectives

The objectives of the Department of Clinical Laboratory Sciences are the following:

- to provide an educational program which prepares students to accurately perform and evaluate analytical tests on body fluids, cells and products

- to foster the development of professional conduct, interpersonal communication skills and ethical principles
- to develop and promote strategies for lifelong learning and to encourage continued professional growth through research, continued education and active participation in professional societies

Accreditation

The undergraduate program in Clinical Laboratory Sciences is accredited by the National Accrediting Agency for Clinical Laboratory Sciences, 8410 W. Bryn Mawr Ave., Suite 670, Chicago, IL 60631-3415; (773) 714-8880. Upon graduation the student is eligible to take the national examinations given by the Board of Registry of the American Society for Clinical Pathology and the National Credentialing Agency for Laboratory Personnel, Inc.

Facilities

The Department of Clinical Laboratory Sciences is located in the Randolph-Minor Annex Building on the MCV Campus. All faculty and clerical offices are located in this facility, as well as student classrooms, general teaching laboratory, computer facilities and a student lounge/reading room.

The teaching laboratories are well equipped with the latest instrumentation used in today's methods of laboratory medicine.

Honors and awards

A. D. Williams Award

An annual award may be made, on nomination of the faculty, to students in each class who demonstrate, by virtue of high scholastic attainment and professional performance, unusual promise and ability. Character, motivation, intellectual curiosity and realization of the opportunities for personal development will be considered. The award is made at the end of the junior and senior years.

Achievement awards

These awards may be given for outstanding achievement in each discipline of clinical laboratory sciences. The awards are given at graduation.

Daria Downing Scholarship Award

This award is in memory of Miss Daria Downing, who was the chief technologist of the clinical laboratories of MCV Hospitals from 1964 until her death in 1982. This award is given in December to an outstanding senior student in the Department of Clinical Laboratory Sciences.

Kupfer Award

This award was first given in 1965 in memory of Dr. Henry G. Kupfer, who was medical director of the School of Medical Technology from 1952 until his death in 1964. It is given to the senior who is considered to be the best all-around technologist. Throughout the program this student must demonstrate an outstanding sense of responsibility in all phases of clinical laboratory science, a keen concern for the patients and the ability to work with others. The student must show a desire for personal and professional growth. The recipient of the award is selected by instructors in the clinical rotations and the faculty of the Department of Clinical Laboratory Sciences.

Financial aid – general

Financial aid is available for all students meeting the criteria for financial assistance. For details of the programs available contact the Financial Aid Office, P.O. Box 980244, Richmond, VA 23298-0244 or telephone: (804) 828-9800.

Bachelor of Science in Clinical Laboratory Sciences Program

Clinical laboratory scientists receive training in the following areas — clinical biochemistry; the study of chemical reactions that occur in normal and diseased processes; hematology, the study of the cellular elements of the blood and blood forming tissues; microbiology, the study of microbiological aspects of infectious disease and the isolation and identification of pathogenic bacteria; immunohematology, the application of theory and principles of blood banking, cell typing, compatibility testing and antibody identification; and immunology, the study of antigen and antibody interaction in the diagnosis of disease. With the rapid advancement of knowledge in the field of laboratory medicine, there is a growing need for highly skilled and knowledgeable clinical laboratory scientists. Employment is found in hospitals, physicians' offices, research facilities, molecular diagnostic, biotechnology, electronic or instrumentation laboratories, industrial quality control, veterinary clinics, and sales and service of health care equipment. In addition to the technical arena, opportunities as managers or consultants exist for graduates of this program.

Admission and general requirements

To qualify for admission, a candidate must have completed a minimum of 60 semester hours of collegiate training in any college or university approved by a recognized regional accrediting agency. Accredited collegiate training in preparation for the study of clinical laboratory sciences as for any professional career, should provide the opportunity for broad general education to include English, the social sciences, the arts and the humanities.

On entry to the department, the student must have completed 12 hours of chemistry (eight hours of general required; the remaining four hours in the order of preference: quantitative, organic or qualitative; other courses may be accepted); 12 hours of biology (preferred four hours of general, four hours of human physiology and four hours of human anatomy; other courses may be accepted); three hours of mathematics; six hours of English composition; three hours of humanities (select from courses in history, philosophy, political science, religion, foreign languages, literature, art history or art appreciation); three hours of social sciences (select from courses in anthropology, economics, geography, psychology, social science or sociology) and one hour of art.

In lieu of a formal course, demonstrated competence in a visual or performing art will be accepted. Acceptable competency includes (1) completion of extracurricular formal instruction independent of structured school activities once per week for a minimum of 18 months within the last 10 years or (2) completion of an AP studio art course or (3) prior training coupled with current routine performances in an organized theatre company, gallery ororchestra/band.

Special admissions

Certified medical laboratory technicians (or those eligible for certification) may qualify for special admission. An MLT applicant must have a minimum of 44 non-MLT semester hours of transferable credit for admission as a full-time student or 38 non-MLT semester hours for admission as a part-time student. The transfer hours must include eight hours of biology, eight hours of chemistry, three hours of mathematics and six hours of English composition. MLTs admitted under special status are required

to complete the science, humanities, social sciences and art requirements for regular admission before they qualify for graduation. Transfer credits are accepted for some CLLS courses. Challenge examinations are offered.

Deadline for submission of applications is May 15. Those received after the deadline will be considered if space is available. Admission notification is done on a rolling basis after receipt of application materials. Detailed information regarding admission requirements and an application may be obtained by writing to the Office of Undergraduate Admissions, Medical College of Virginia Campus, Virginia Commonwealth University, P.O. Box 980632, Richmond, VA 23298-0632, or to the Department of Clinical Laboratory Sciences, Virginia Commonwealth University, P.O. Box 980583, Richmond, VA 23298-0583 or from the Web at views.vcu.edu/sahp/cls.

Academic Regulations

The minimum passing grade for all professional courses leading to the bachelor of science degree is "D." All courses must be completed with a passing grade for the student to be eligible for promotion or graduation. Satisfactory completion of the previous semester's course work is a prerequisite to the next semester.

Promotion is based on recommendations of the faculty. The student is expected to do all of the following:

- maintain a GPA of 2.0 or better
- obtain a passing grade in all courses
- complete the clinical education requirements to the satisfaction of the clinical and academic faculty
- exhibit the attitudes and skills deemed necessary to function as a professional clinical laboratory scientist
- pay all fees

Detailed grading policies plus the mechanism for grade appeals are given to each entering student during orientation.

Curriculum

Variable credit is offered in consideration of the differing academic backgrounds of entering students. Semester hours given for each course are those required of the traditional student with no previous clinical training.

Junior year	credits
CLLS 301-302 Hematology	7.5
CLLS 303 Parasitology	1.0
CLLS 304 Clinical Microscopy	2.0
CLLS 306 Immunohematology	4.5
CLLS 307 Introduction to Pathogenic Microbiology	3.0
CLLS 308 Pathogenic Microbiology	5.0
CLLS 310 Clinical Immunology	4.5
CLLS 311-312 Biochemistry	8.0
CLLS 314 Clinical Instrumentation	3.0
Summer session	
CLLS 337 Clinical Education	1.0
	39.5
Senior year	
CLLS 407 Interpretive Immunohematology	2.5
CLLS 408 Advanced Microbiology	2.0
CLLS 409 Interpretive Hematology	2.0
CLLS 410 Advanced Clinical Biochemistry/Instrumentation	2.0
CLLS 411 Principles of Education/Management	3.0
CLLS 412 Clinical Correlations	1.0
CLLS 415 Special Topics in Clinical Laboratory Sciences (optional)	1-6
CLLS 483 Biochemistry Practicum	3.0
CLLS 485 Hematology Practicum	3.0
CLLS 493 Clinical Microbiology Practicum	3.0
CLLS 494 Miscellaneous Clinical Practicum	3.0
CLLS 496 Blood Bank Practicum	3.0
CLLS 438 Research Paper (optional)	1.0
	27.5-34

Upon completion of prerequisite courses and the prescribed curriculum listed above, graduates of the Clinical Laboratory Sciences program, will have fulfilled the general education requirements of VCU.

Courses in clinical laboratory sciences (CLLS)

CLLS 201 Introduction to Clinical Laboratory Science
Semester course; 1 lecture hour. 1 credit. Open to students on the Academic Campus who are interested in clinical laboratory science/medical technology as a career. Presentation and discussion of clinical laboratory science including an introduction to each of the specific areas of concentration, job opportunities in the profession and a tour of a hospital laboratory. Graded as pass/fail.

CLLS 300 Basic Concepts
Semester course; 1 lecture and 1 laboratory hour. 1.5 credits. An introduction to the basic concepts/techniques applicable to all laboratory science areas. Includes optical physics, quality control, laboratory safety, medical terminology and pipetting techniques along with other basic subjects.

CLLS 301-302 Hematology
Continuous course; 4.5 lecture and 6 laboratory hours. 2-7.5 credits. A study of the blood and blood-forming tissues. Emphasis is placed on hematologic techniques, accurate identification of normal and abnormal cells and their correlation with normal or pathologic conditions. An introduction to the hemostatic mechanism also is presented.

CLLS 303 Parasitology
Semester course; 1 lecture hour. 0.5-1.5 credits. A study of the life cycles of parasites and techniques used for isolation and identification of common parasites found in humans.

CLLS 304 Clinical Microscopy
Semester course; 1.5 lecture and 1 laboratory hour. 1-2 credits. A study of the principles and practices of urinalysis, kidney function, gastric analysis, cerebrospinal fluid and other body fluids.

CLLS 306 Immunohematology
Semester course; 2.5 lecture and 4 laboratory hours. 2-5 credits. Prerequisite: CLLS 310. A study of the theory and principles of blood banking with an emphasis on methods and techniques used in the laboratory for cell typing, cross-matching and antibody identification.

CLLS 307 Introduction to Pathogenic Microbiology
Semester course; 3 lecture hours. 1-3 credits. Fundamental principles of diagnostic pathogenic microbiology.

CLLS 308 Pathogenic Microbiology
Semester course; 3 lecture and 4 laboratory hours. 3-5 credits. Prerequisite: CLLS 307 or permission of instructor. The study of bacteria, fungi, viruses, antimicrobial susceptibility testing and quality control; the relationship of bacteria, fungi and viruses to infectious diseases including pathogenesis and epidemiology. Emphasis is placed on the techniques, methods and procedures required to isolate and identify pathogenic micro-organisms.

CLLS 310 Clinical Immunology
Semester course; 3.5 lecture and 2 laboratory hours. 3-4.5 credits. Introduces the basic principles of immunology, serology and molecular diagnostics. Emphasis is placed on laboratory evaluation of the immune response including both cellular and humoral aspects. Serologic techniques are practiced in the laboratory sessions.

CLLS 311-312 Biochemistry
Continuous course; 6 lecture and 4 laboratory hours. 2-8 credits. A study of metabolism in normal and disease processes of the body. Emphasis is placed on the principles and methods used in testing biochemical reactions.

CLLS 314 Clinical Instrumentation
Semester course; 2 lecture and 2 laboratory hours. 1-3 credits. Covers instrumentation found in clinical laboratories, including an introduction to electronic principles as applied to instrumentation. Course will examine the theory and application behind the various analytical methods used in clinical analysis.

CLLS 337 Clinical Education
Semester course; 120 clock hours. 1 credit. Offered: S. Supervised clinical experience in hospitals across the state is designed to give the student a broader clinical education and to provide venipuncture experience. In addition to the application of academically acquired knowledge, this affiliation provides an opportunity for the student to correlate each area of study into one composite picture for final laboratory diagnosis. Closer working relationships with other allied health personnel is an important aspect of this affiliation. Graded as pass/fail.

CLLS 407 Interpretive Immunohematology
Semester course; 2.5 lecture hours. 2-2.5 credits. Prerequisites: CLLS 306 and 310, or permission of

instructor. Advanced study of the principles of immunohematology and immunology with major emphasis on blood group systems and blood components. Includes the application of laboratory data and techniques to solve problems in blood banking and immunology.

CLLS 408 Advanced Microbiology
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 307 and 308, or permission of instructor. Advanced study of the principles of pathogenic microbiology. Includes the application of laboratory data and techniques to solve problems in the clinical microbiology laboratory.

CLLS 409 Interpretive Hematology
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 301-302 and 485, or permission of instructor. Advanced study of the principles of hematopoiesis and their pathophysiological correlation to hematological disorders. Interpretation of morphological findings are correlated with case histories. Includes homeostatic problems.

CLLS 410 Advanced Clinical Biochemistry/Instrumentation
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLLS 311-312 and 314, or permission of instructor. Presents an advanced study of (1) the principles of clinical chemistry as related to intermediary metabolism and pathology and (2) laboratory and hospital information systems. Includes the application of laboratory data and technologies to solve problems in analytical methods and instruments.

CLLS 411 Principles of Education/Management
Semester course; 3 lecture hours. 2.5-3.5 credits. Introduces fundamental educational theories and practice, principles of management and employee relations and health-care issues from a global perspective with an emphasis on multicultural diversity. Stresses the application of these theories in the clinical laboratory.

CLLS 412 Clinical Correlations
Semester course; 1 lecture hour. 1 credit. Seminars are presented on various aspects of professionalism, and the interrelationships of the various laboratory disciplines are discussed during review sessions. A simulated registry exam is given at the conclusion. Graded as pass/fail.

CLLS 415 Special Topics in Clinical Laboratory Sciences
Semester course; 1-6 credits. Course provides for tutorial studies, laboratory experience and/or library assignments in specialized areas for those students who have previous course work or laboratory experience in a specific subject.

CLLS 438/HONR 492 Research Paper
Semester course; 1 lecture hour. 1 credit. This course is designed to introduce the student to the fundamentals of scientific writing.

CLLS 483 Biochemistry Practicum
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisites: CLLS 311-312. Individual participation in hospital chemistry laboratories. Students gain practical experience in the use of procedures and instruments by working with the staff. After gaining competence, students are expected to perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 485 Hematology Practicum
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisites: CLLS 301-302. Individual participation in hospital hematology laboratories. Students gain practical experience in the use of procedures and instruments by working with the staff. After gaining competence, the students are expected to perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 493 Clinical Microbiology Practicum
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisites: CLLS 307-308. Individual participation in hospital bacteriology laboratories. Students gain practical experience in the performance and use of procedures by working with the clinical staff. After gaining competence, the students are expected to properly perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 494 Miscellaneous Clinical Practicum
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisites: CLLS 301-302, 308, 310, 311-312 or permission of instructor. Students gain practical experience in the use of instruments and the performance of procedures by working with the clinical staff. After gaining competence, students are expected to properly perform and sign out routine laboratory work under supervision. Graded as pass/fail.

CLLS 496 Blood Bank Practicum
Semester course; 40-180 clock hours. 1-4.5 credits. Prerequisite: CLLS 306. Individual participation in hospital blood bank laboratories and Virginia Blood Services. Students gain practical experience in the use of procedures and instruments by working with the staff. Donor drawing and component preparation is observed. After gaining competence, the students are expected to properly perform and sign out routine laboratory work under supervision. Graded as pass/fail.

Department of Radiation Sciences

Terri L. Fauber
Assistant Professor and Department Chair (1985)
B.S. 1982 University of Texas
M.A. 1985 Louisiana Tech University
Ed.S. 1991 The College of William and Mary
Ed.D. 1996 The College of William and Mary

King, Lenna D. (1998) Assistant Professor
A.S. 1987 University of Louisville
B.S. 1987 University of Louisville
M.S. 1993 Central Michigan University

Legg, Jeffrey S. (1998) Instructor
A.S. 1987 Virginia Commonwealth University
B.S. 1989 Virginia Commonwealth University
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Meixner, Elizabeth L. (1988) Assistant Professor
B.S. 1973 Virginia Polytechnic Institute and State University
M.Ed. 1981 Virginia Commonwealth University

Swafford, Larry G. (1992) Assistant Professor
A.A.S. 1985 Belleville Area College
B.S. 1988 University of Oklahoma
M.Ed. 1997 Virginia Commonwealth University

Medical advisers
Melvin J. Fratkin, M.D. James M. Messmer, M.D.
Monica R. Morris, M.D.

History

Radiologic technology education began at the Medical College of Virginia in the 1930s with a one-year training program in radiography. This program has undergone a number of changes through the years to evolve into the current baccalaureate educational program.

A concentration in nuclear medicine technology was added in 1984 and in radiation therapy in 1992. Degree completion programs have been added to provide an opportunity for certified technologists and therapists to complete requirements for the baccalaureate degree.

Programs

A Bachelor of Science in Clinical Radiation Sciences is offered in the following areas of concentration: radiography, nuclear medicine technology and radiation therapy. These full-time programs include general education and professional course work over a three year period. Graduates of each of the programs are eligible for national certification examinations in their respective area of concentration.

Mission

The Department of Radiation Sciences is an integral part of the School of Allied Health Professions of the MCV Campus and shares its values. The department serves as a national leader in the education of students in the radiation sciences and provides learning opportunities that are innovative and educationally sound. Strong linkages with clinical affiliates and their staff are vital to the department's success. Faculty and staff work in a cooperative spirit in an environment conducive to inquisitiveness and independent learning to help a diverse student body develop to its fullest potential. The faculty is committed to the concept of lifelong learning, and promotes standards of clinical practice that will serve students throughout their professional careers. Faculty serve as a resource for professionals in practice and contribute to an expanded knowledge base in the field of clinical radiation sciences.

Goals

The goals of the Department of Radiation Sciences are to:

1. deliver thoughtfully developed curricula in radiation sciences for individuals preparing for professional practice,
2. offer timely, relevant educational. opportunities that encourage practicing professionals to complete a baccalaureate degree.
3. provide an educational atmosphere that will engender intellectual curiosity and commitment to lifelong learning.
4. cultivate professional behavior and ethical conduct.
5. promote research and scholarly activity in the radiation sciences and health related sciences.

Accreditation

The Radiography and Radiation Therapy programs are accredited by the Joint Review Committee on Education in Radiologic Technology. The Nuclear Medicine Technology Program is accredited by the Joint Review Committee on Educational Programs in Nuclear Medicine Technology. Upon completion of one of the concentrations, the graduate is eligible for the relevant national certification examination administrated by the American Registry of Radiologic Technologists. Graduates of the Nuclear Medicine Technology Program also are eligible for the certification examination administered by the Nuclear Medicine Technology Certification Board.

Facilities

The educational facilities for the Department of Radiation Sciences are located in the west wing of the sixth floor of the West Hospital Building, 1200 E. Broad St. These facilities include two well-equipped, energized radiographic laboratories with automatic film processing capabilities.

During the various phases of the curriculum, students will be assigned to one or more of the following affiliate institutions: VCU Health System's Medical College of Virginia Hospitals, McGuire Veterans Affairs Medical Center and Richmond Division of Columbia HCA Hospitals.

Honors and awards

A. D. Williams Award

This award is given to the student in each class who has achieved the highest cumulative GPA.

A. D. Williams Scholarship

This scholarship may be awarded to students who demonstrate high scholastic attainment, professional clinical performance and unusual promise as a radiologic technologist.

Senior awards

An award may be given to a graduating senior in each curriculum in recognition of outstanding overall performance. Selection is based on cumulative GPA, faculty recommendations and clinical performance.

Radiography – Nycomed Amersham Award
Nuclear Medicine – Mallinckrodt Award
Radiation Therapy – Varian Medical Systems Award

Tina Plaster Memorial Award

This award honors a member of the class of 1992 who was tragically killed during the term of her program and recognizes a rising radiography senior who displays the following characteristics associated with Ms. Plaster: excellent academic standing, good attendance, excellent patient care and high standards of professionalism.

Bachelor of Science in Clinical Radiation Sciences Program

Admission requirements

Candidates for admission to any of the three concentrations must have completed high school or have passed a GED examination, and have completed the following postsecondary courses:

	VCU equivalent
3 credits of precalculus	MATH 151
3 credits of general psychology	PSYC 101
3 credits of composition and rhetoric	ENGL 101
3 credits of social science	
8 credits of human anatomy and physiology	BIOL 205, PHIS 206
8 credits of college physics	PHYS 201, 202

Transcripts of postsecondary work must be submitted with the application. Candidates also must submit personal references and complete an interview with a member of the admissions committee. Applicants are encouraged to obtain some knowledge of the concentration to which they are applying by observing in the appropriate hospital department or by working as a hospital volunteer.

Applications must be submitted by Feb. 1 of each year. Applications submitted after that date can be accepted only on a space-available basis. Correspondence should be sent to the Office of Undergraduate Admissions, MCV Campus, Virginia Commonwealth University, P.O. Box 980632, Richmond, VA 23298-0632.

General education requirements

1. **Communicating**
   ENGL 101 and ENGL 200 or equivalent – 6 credits
   CLRS 208 – 3 credits, writing intensive
   CLRS 390 – 2 credits; writing intensive
   CLRS 498 – 3 credits, writing intensive

2. **Ethics**
   CLRS 208 – 3 credits
   CLRS 393, 394, 395, 493, and 494 – seminars associated with each clinical course
   PHIL 213 – 3 credits (Nuclear Medicine only)

3. **Quantity and form**
   MATH 151 or equivalent
   STAT 210 or equivalent
   CLRS 232 – 2 credits
   CLRS 341 – 4 credits
   CLRS 320 – 3 credits (Radiography only)
   CLRS 451 – 3 credits (Radiography only)
   CLRS 461 – 3 credits (Nuclear Medicine only)
   CLRS 323 – 4 credits (Radiation Therapy only)

4. **Science and technology**
   PHYS 201-202 or equivalent – 8 credits
   BIOL 205-206 or equivalent – 8 credits
   CHEM 101-102 or equivalent – 8 credits (Nuclear Medicine only)

5. **Interdependence**
   CLRS 393, 394, 395, 493 and 494 – seminars associated with each clinical course
   HCMG 300 – 3 credits

6. **Visual and performing arts**
   Elective – 1 credit

7. **Humanities and social sciences**
   PSYC 101 – 4 credits
   Humanities elective – 3 credits

Academic regulations

To continue in the respective program, the student is expected to:

1. maintain a minimum semester grade-point and cumulative GPA of 2.0,
2. obtain a passing grade in all required courses and a "C" or better in all professional courses indicated with an asterisk in the curriculum outline and
3. demonstrate the attitude and skills necessary to function as a professional in the selected area of concentration as assessed by academic and clinical faculty.

Curriculum

Radiography concentration

	credits fall	credits spring
Sophomore year		
ENGL 200 The Craft of Writing with Research	-	3
HCMG 300 Health-care Organization and Services	3	-
CLRS 200 Medical Terminology for Radiation Sciences	1	-
CLRS 203-204 Pathophysiology I and II	3	3
CLRS 205 Exploring Radiation Sciences	1	-
CLRS 206 Cross-sectional Anatomy	-	2
CLRS 208 Foundations of Patient Care*	-	3
CLRS 232 Radiation Safety*	-	2
STAT 210 Basic Practice of Statistics	3	-
Electives/humanities electives	5	3
	16	16
Summer I		
CLRS 201 Introduction to Radiographic Imaging*	2	
CLRS 211 Radiographic Procedures I*	2	
	4	
Junior year		
CLRS 311 Radiographic Procedures II*	4	-
CLRS 312 Radiographic Procedures III*	-	2
CLRS 320 Principles of Radiographic Imaging*	-	3
CLRZ 320 Principles of Radiographic Imaging Laboratory*	-	1
CLRS 341 Radiation Physics	3	-
CLRS 390 Research Methods in the Radiation Sciences	2	-
CLRS 393-394 Clinical Education I and II*	3	4
Restricted electives	3	6
	15	16
Summer II		
CLRS 395 Clinical Education III*	5	
	5	
Senior year		
CLRS 330 Radiobiology*	-	2
CLRS 402 Radiographic Pathology	-	2
CLRS 421 Radiographic Imaging Equipment*	-	2
CLRS 451 Quality Management in Radiography*	3	-
CLRS 488 Senior Seminar	-	1
CLRS 493-494 Clinical Education IV and V*	5	5
CLRS 498 Senior Project	3	-
Restricted electives	6	3
	17	15

Radiation therapy concentration+

	credits fall	credits spring
Sophomore year		
ENGL 200 The Craft or Writing with Research	-	3
HCMG 300 Health-care Organization and Services	3	-
HLTH 487 Coping and Adaptation or PSYC 308 Stress Management	-	3
CLRS 200 Medical Terminology for Radiation Sciences	1	-
CLRS 203-204 Pathophysiology I and II	3	3
CLRS 205 Exploring Radiation Sciences	1	-
CLRS 206 Cross-sectional Anatomy	-	2
CLRS 208 Foundations of Patient Care*	-	3
CLRS 232 Radiation Safety*	-	2
STAT 210 Basic Practice of Statistics	3	-
General electives	5	-
	16	16
Summer I		
CLRS 305 Orientation to Radiation Therapy*	2	
	2	
Junior year		
CLRS 309 Oncologic Patient Care*	2	-
CLRS 314 Pathology and Treatment Principles I*	-	4
CLRS 323 Radiation Therapy Techniques and Applications*	4	-
CLRS 341 Radiation Physics	3	-
CLRS 342 Physics for Radiation Therapy*	-	3
CLRS 390 Research Methods in the Radiation Sciences	2	-
CLRS 393-394 Clinical Education I and II*	4	4
Restricted elective	-	3
Elective	-	2
	15	16
Summer II		
CLRS 315 Pathology and Treatment Principles II*	3	
CLRS 395 Clinical Education III*	5	
	8	
Senior year		
CLRS 330 Radiobiology*	-	2
CLRS 412 Radiation Therapy Treatment Planning	-	3
CLRS 455 Quality Management in Radiation Therapy*	2	-
CLRS 488 Senior Seminar	-	1
CLRS 493-494 Clinical Education IV and V*	5	5
CLRS 498 Senior Project	3	-
Restricted electives	6	3
	16	14

Nuclear medicine technology concentration+

	credits fall	credits spring
Sophomore year		
CHEM 101-102 General Chemistry and CHEZ/FRSZ 101-102 General Chemistry Laboratory	4	4
CLRS 200 Medical Terminology for Radiation Sciences	1	-
CLRS 203-204 Pathophysiology I and II	3	3
CLRS 205 Exploring Radiation Sciences	1	-
CLRS 208 Principles of Patient Care*	-	3
CLRS 232 Radiation Safety*	-	2
ENGL 200 The Craft or Writing with Research	-	3
HCMG Health-care Organization and Services	3	-
STAT 210 Basic Practice of Statistics	3	-
	15	15
Summer I		
CLRS 303 Orientation to Nuclear Medicine*	2	
	2	
Junior year		
CLRS 206 Cross-sectional Anatomy	2	-
CLRS 317 Clinical Nuclear Medicine: Imaging Techniques I*	2	-
CLRS 318 Nuclear Medicine Imaging II*	-	2
CLRS 321 Nuclear Medicine Instrumentation and Computer Techniques I*	2	-
CLRS 322 Nuclear Medicine Instrumentation and Computer Techniques II*	-	2
CLRZ 328L Nuclear Medicine Instrumentation and Image Processing Laboratory	-	1
CLRS 341 Radiation Physics	3	-
CLRS 344 Physics for Nuclear Medicine	-	3
CLRS 390 Research Methods in the Radiation Sciences	2	-
CLRS 393-394 Clinical Education I and II*	4	4
General electives	-	4
	15	16
Summer II		
CLRS 313 Clinical Nuclear Medicine: Nonimaging Techniques*	3	
CLRS 395 Clinical Education III*	5	
	8	
Senior year		
CLRS 319 Advanced Nuclear Medicine Imaging	3	-
CLRS 330 Radiobiology*	-	2
CLRS 453 Quality Management in Nuclear Medicine*	-	3
CLRS 461 Radiopharmaceutical Preparation and Quality Control*	2	-

CLRS 488 Senior Seminar	-	1
CLRS 493-494 Clinical Education IV and V*	5	5
CLRS 498 Senior Project	3	-
PHIL 213 Ethics and Health Care	3	-
General electives	-	4
	16	15

* "C" is lowest passing grade.
+ Elective credits must include a minimum of one credit in visual or performing arts.

Degree completion programs

Full- or part-time opportunities to complete a baccalaureate degree are offered for technologists or therapists certified by the American Registry of Radiologic Technologists and/or the Nuclear Medicine Technology Certification Board. In addition to general education and professional course work, the student selects electives from a wide variety of courses, allowing the design of a program that best meets the goals and interests of the individual. For more information, contact the department.

Courses in clinical radiation sciences (CLRS)

CLRS 101 Introduction to Clinical Radiation Sciences
Semester course; 1 lecture hour. 1 credit. Open to students on the Academic Campus who are interested in clinical radiation sciences as a career. Presentation and discussion of the art and science of medical imaging. The use of ionizing radiation will be explored from its discovery to its current application in therapy and medical diagnosis. Radiography, nuclear medicine and radiation therapy will be discussed in terms of career specialties within the profession.

CLRS 200 Medical Terminology for the Radiation Sciences
Semester course; 2 tutorial laboratory hours. 1 credit. Assists the student in building a medical vocabulary utilizing suffixes, prefixes and word roots, along with terms appropriate to body systems and organs. Emphasis is on understanding basic medical terms and gaining experience in applying that knowledge.

CLRS 201 Introduction to Radiographic Imaging
Semester course; 1 lecture and 2 laboratory hours. 2 credits. Prerequisite: CLRS 208 and CLRS 232. Introduction to the clinical process, equipment and radiographic imaging. Information will be presented that prepares the student to begin clinical practice. Clinical rotations and lab exercises are designed to expose the student to various aspects of radiographic imaging.

CLRS 203-204 Pathophysiology I and II
Continuous course; 3-3 lecture hours. 3-3 credits. Prerequisites: BIOL 205 and PHIS 206. Presentation of the principles of disease and an introduction to various conditions of illness involving body systems.

CLRS 205 Exploring Radiation Sciences
Semester course; 1 lecture hour. 1 credit. A general overview of the wide variety of imaging and treatment modalities in radiation sciences will be presented. Emphasis will be on understanding how these modalities are utilized in today's complex health-care environment, as well as the role of the technologist/therapist.

CLRS 206 Cross-sectional Anatomy
Semester course; 4 tutorial laboratory hours. 2 credits. Prerequisites: BIOL 205, PHIZ 206L, or permission of instructor. A general overview of cross-sectional anatomy at representative levels will be presented. Emphasis will be on identifying major muscles, organs, bones and vessels on diagrams, photographs and images.

CLRS 208 Foundations of Patient Care
Semester course; 3 lecture hours. 3 credits. Prerequisite: BIOL 200 or equivalent. Legal, ethical and technical foundations of patient care will be explored with emphasis on the application of these principles to common radiologic situations.

CLRS 211 Radiographic Procedures I
Semester course; 1 lecture and 3 laboratory hours. 2 credits. Prerequisites: BIOL 205 and PHIS 206 and CLRS 208. Combines the study of anatomy and physiology and positioning for diagnostic radiographic examinations of the upper extremity, chest and abdomen. During laboratories, students demonstrate competence in radiographic procedures, including positioning of simulated patients, manipulation of radiographic equipment and evaluation of radiographs.

CLRS 232 Radiation Safety
Semester course; 2 lecture hours. 2 credits. Prerequisite: PHYS 202. Provides an overview of radiation protection as it applies to the radiation sciences. Radiation sources, detection and regulations are presented. In addition, radiation protection responsibilities of the radiologic technologist for patients, personnel and public are discussed.

CLRS 303 Orientation to Nuclear Medicine
Semester course; 1 lecture and 2 clinical hours. 2 credits. Prerequisites: CLRS 208 and CLRS 232. Designed to acquaint the student with the field of nuclear medicine in general and the Program in Nuclear Medicine Technology in particular. It also provides an introduction to clinical practice.

CLRS 305 Orientation to Radiation Therapy
Semester course; 1 lecture 2 laboratory hours. 2 credits. Prerequisites: CLRS 208 and CLRS 232. Introduction to the clinical process, equipment and history of radiation therapy. Information will be presented that prepares the student to begin clinical practice. Clinical rotations and lab exercises are designed to expose the student to various aspects of radiation therapy.

CLRS 309 Oncologic Patient Care
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 208. Covers the basic concepts of patient care specific to radiation therapy, including consideration of physical and psychological conditions. Patient interactions, patient examinations, asepsis, local and systemic reactions, nutrition and medications are discussed. Factors influencing patient health during and following a course of radiation will be identified.

CLRS 311 Radiographic Procedures II
Semester course; 3 lecture and 3 laboratory hours. 4 credits. Prerequisite: CLRS 211. Continuation of CLRS 211 with emphasis on anatomy and physiology and positioning for diagnostic radiographic examinations of the lower extremity, spine, pelvis and thorax, routine contrast studies, and basic and advanced headwork. Laboratory experience will include positioning of simulated patients, positioning and exposure of radiographic phantoms, manipulation of radiographic equipment and evaluation of radiographs.

CLRS 312 Radiographic Procedures III
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 311. Continuation of CLRS 211 and CLRS 311 to cover additional positions added to routine examinations. In addition, a variety of routine special studies and special procedures that visualize the circulatory, lymphatic, reproductive, urinary and central nervous systems will be discussed.

CLRS 313 Clinical Nuclear Medicine: Nonimaging
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 322. Integrates basic anatomy and physiology with nonimaging in-vitro nuclear medicine procedures. Topics include current radiopharmaceuticals of choice, biorouting of administered radiopharmaceuticals, normal and abnormal test values and patient or specimen counting techniques.

CLRS 314 Pathology and Treatment Principles I
Semester course; 4 lecture hours. 4 credits. Prerequisite: CLRS 309. Presents the fundamentals of the disease processes for cancer of the following: skin, thorax, genitourinary, gynecological, head and neck, central nervous system and breast. The malignant condition, etiology and epidemiology, patient workup, and methods of treatment are discussed. Attention to patient prognosis, treatment results and the effects of combined therapies.

CLRS 315 Pathology and Treatment Principles II
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 309 and 314. A continuation of CLRS 314. Presents the fundamentals of the disease process for the following cancers: gastrointestinal, lymphomas and hematologic malignancies, bone tumors, childhood tumors, eye and orbital tumors. The malignant condition, etiology and epidemiology, patient workup and methods of treatment are discussed. Attention is given to patient prognosis, treatment results and the effects of combined therapies. Radiotherapeutic emergencies, palliation and combined modality treatment also will be discussed.

CLRS 317 Clinical Nuclear Medicine: Imaging Techniques I
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 303. Corequisite: CLRS 321 Presentation of the techniques employed in the performance of routine nuclear medicine imaging procedures. Topics include anatomy and physiology, pathology, patient preparation, contraindications, radiopharmaceuticals, dose route of administration, biodistribution, imaging protocols, equipment setup and common findings.

CLRS 318 Clinical Nuclear Medicine: Imaging Techniques II
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 317. Corequisite: CLRS 322. Presentation of the techniques employed in the

performance of nonroutine nuclear medicine imaging procedures. Topics include anatomy and physiology, pathology, patient preparation, contraindications, radiopharmaceuticals, dose route of administration, biodistribution, imaging protocols, equipment set up and common findings.

CLRS 320 Principles of Radiographic Imaging
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 201 and CLRS 341. The variables that affect image production and radiographic quality will be presented. Radiographic quality will be analyzed to differentiate between diagnostic and optimal radiographs. Emphasis will be placed on sharpness and visibility of recorded detail.

CLRZ 320L Principles of Radiographic Imaging Laboratory
Semester course; 2 laboratory hours. 1 credit. Prerequisite: CLRS 201. Can be taken concurrently with or subsequently to CLRS 320. Designed to demonstrate the affect of radiographic variables on image production and quality. Students will perform lab exercises to manipulate a variety of variables and analyze their affect on the radiographic image.

CLRS 321 Nuclear Medicine Instrumentation and Computer Techniques I
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 303. Corequisite: CLRS 317. Pre- or corequisite: CMSC 128. Presentation of the operating principles of standard nuclear medicine imaging instrumentation systems with their practical applications. Topics include: Planar, SPECT and Positron Imaging devices and their associated components.

CLRS 322 Nuclear Medicine Instrumentation and Computer Techniques II
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 321 and CLRS 317. Pre- or corequisite: CMSC 128. Corequisite: CLRS 318. Combines the principles of nuclear medicine instrumentation with practical operation of the equipment. Instruments presented: survey meters, dose calibration, counting devices and image processing computers.

CLRS 323 Radiation Therapy, Techniques and Applications
Semester course; 4 lecture hours. 4 credits. Presents the basic concepts of dosimetry and treatment planning. Various external beam techniques and applications, depth dose data and summation of isodose curves are discussed. Modalities of treatment, patient setup, dose measurement and verification also are included.

CLRZ 328L Nuclear Medicine Instrumentation and Image Processing
Semester course; 2 laboratory hours. 1 credit. Prerequisites: CLRS 317 and 321. Corequisites: CLRS 318 and 322. Presentation of the applications and techniques employed in the fundamentals of nuclear medicine detection instruments and hands-on processing of various nuclear medicine imaging procedures. Topics include operation of the single and multiple channel analyzer, spectrometers, uptake probe and well counter, GM survey meter and the dose calibrator. Image processing will be performed with nuclear medicine cardiac, renal, gastric emptying and tumor images varying the display parameters and reconstruction filters.

CLRS 330 Radiobiology
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 232 or permission of instructor. The principles of biologic responses to radiation are presented, including factors influencing radiation effects, tissue sensitivity and tolerance. Clinical applications in radiography, nuclear medicine and radiation therapy are considered.

CLRS 341 Radiation Physics
Semester course; 3 lecture hours. 3 credits. Prerequisite: PHYS 202. Presentation of the production of X- and gamma rays; interaction of radiation with matter; units of radioactive exposure and absorbed dose, and measurement of radiation.

CLRS 342 Physics for Radiation Therapy
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 323 and CLRS 341. Includes a discussion of the properties of electromagnetic and particulate radiation. Details of production, interactions, treatment units, measurement of radiation, radioactivity and brachytherapy are presented.

CLRS 344 Physics for Nuclear Medicine
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 341. Topics in physics relevant to nuclear medicine technology will be presented. Topics include nuclear decay, nuclear interactions, production of radionuclides, gamma-ray spectroscopy, theory of nuclear medicine instrumentation, image processing and topographic reconstruction.

CLRS 390 Research Methods in the Radiation Sciences
Semester course; 2 lecture hours. 2 credits. Prerequisite: ENGL 200. Pre- or corequisite: STAT 210. The fundamentals of the research process will be presented for analysis and discussion. Elements of research appropriate to the radiation sciences will be reviewed. Emphasis will be on the ability to critically review research studies along with the selection and design of a research project.

CLRS 393-394 Clinical Education I and II
Continuous course; variable clinical hours. 3-5 credits. Prerequisites: CLRS 208, CLRS 232 and CLRS 201, or CLRS 303 or CLRS 305. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain practical experience in routine, basic procedures and observe more advanced procedures.

CLRS 395 Clinical Education III
Semester course; 360 clinical hours. 5 credits. Prerequisite: CLRS 394. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain additional practical experience in routine, basic procedures and begin to gain experience in advanced procedures.

CLRS 402 Radiographic Pathology
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 204 and CLRS 493, or permission of instructor. Introduction to the study of radiographic pathology through reading and observation of film interpretation. Emphasis is on recognizing common disease processes as demonstrated radiographically; where appropriate, understanding how to vary positioning and techniques to produce optimally diagnostic images and the role of different imaging modalities in the evaluation of disease.

CLRS 403 Advanced Patient Care for the Imaging Professional
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 208 Foundations of Patient Care or permission of instructor. An interdisciplinary course that explores advanced patient care techniques and legal/ethical considerations in the radiation sciences. Emphasis is placed on the application of these principles.

CLRZ 403L Advanced Patient Care for the Imaging Professional
Semester course; 2 laboratory hours. 1 credit. Prerequisite: CLRS 208 Foundations of Patient Care or permission of instructor. Can be taken concurrently with or subsequent to CLRS 403. This course provides simulated experience in performing advanced patient care techniques related to the radiation sciences. Topics include cardiac rhythm interpretation, advanced cardiac life support, urinary catheterization, tracheostomy care, basic laboratory skills, basic respiratory therapy skills, pulse oximetry, IV therapy and pharmacology, and conscious sedation.

CLRS 405 Principles of Mammography
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 201 and CLRS 320, or permission of instructor. Presentations and discussions designed to provide an overview of the principles of mammography. Topics include history, anatomy, physiology and pathology of the breast; exposure techniques; and quality control. Focuses on routine and specialized positioning of the breast and image evaluation to prepare students for practical experience in mammography.

CLRZ 405L Principles of Mammography Lab
Semester course; 2 laboratory hours. 1 credit. Prerequisites: CLRS 201 and CLRS 320, or permission of instructor. Can be taken concurrently with or subsequently to CLRS 405. Provides simulated experience in performing positioning of the breast. Students will be expected to demonstrate competence in positioning the breast phantom for a variety of routine and specialized projections. In addition, quality control procedures specific to mammography will be performed.

CLRS 406 Introduction to MRI
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 341 or permission of instructor. An introduction to the elements of magnetic resonance imaging, including instrumentation, physical principles, image production and quality, MR safety, magnetic resonance angiography and imaging applications.

CLRS 408 Introduction to Computed Tomography (CT)
Semester course; 3 lecture hours. 3 credits. Prerequisite: CLRS 206 and 341 or permission of instructor. This course provides the student with an overview of computed tomography. Topics include computed tomography physical principles, data acquisition/image reconstruction, equipment and terminology. Imaging parameters, patient care issues (i.e., preparation, monitoring) quality control and clinical application in medical imaging also will be introduced. Lastly, emerging technologies/techniques and special studies involving computed tomography will be discussed.

CLRS 412 Radiation Therapy Treatment Planning
Semester course; 2 lecture hours and 2 laboratory hours. 3 credits. Prerequisite: CLRS 323 and 342 or permission of instructor. An introduction to routine 2-D and 3-D treatment planning for the most common forms of

cancer including prostate, rectum, lung, breast and head and neck regions. Simulated lab training using the ADAC Pinnacle treatment planning system will be included. Emphasis will be on the rationale and process of treatment planning for patients undergoing radiation therapy.

CLRS 417 Advanced Nuclear Medicine Imaging Procedures
Semester course; 3 lecture hours. 3 credits. Prerequisites: CLRS 318, CLRS 322, CLRS 313. Presentation of the techniques employed in the performance of advanced nuclear medicine imaging procedures. Topics include anatomy and physiology, pathology, patient preparation, contraindications, radiopharmaceuticals, dose route administration, biodistribution, imaging protocols, computer software techniques, equipment set up and common findings.

CLRS 421 Radiographic Imaging Equipment
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 320. Principles and operation of general and specialized X-ray equipment are presented. Emphasis is on equipment necessary to perform radiographic, fluoroscopic and tomographic examinations.

CLRS 451 Quality Management in Radiography
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisites: CLRS 320 and CLRZ 320L. Designed to investigate quality control measures in radiology. Emphasis will be monitoring components of the imaging system that may affect radiographic quality through improper functioning. Lab exercises will provide students an opportunity to perform various quality control checks on the processor and imaging equipment.

CLRS 453 Quality Management in Nuclear Medicine
Semester course; 2 lecture and 2 laboratory hours. 3 credits. Prerequisite: CLRS 322. Explores the quality assurance parameters in a nuclear medicine department. Emphasis is given to the performance of tests to assess survey meters, spectrometers, dose calibrators, gamma cameras and SPECT imaging systems. Additionally, quality assurance is discussed in terms of radiopharmaceuticals, radioimmunoassay laboratories and patient management.

CLRS 455 Quality Management in Radiation Therapy
Semester course; 2 lecture hours. 2 credits. Prerequisite: CLRS 323. Designed to provide the student with knowledge of the concepts and principles of quality assurance. The performance of various tests including purpose, sources of malfunction and action guidelines will be discussed.

CLRS 461 Radiopharmaceutical: Preparation and Quality Control
Semester course; 2 lecture hours. 2 credits. Prerequisites: CLRS 303 and two semesters of general chemistry. Provides the technical knowledge necessary for the preparation and quality control of radiopharmaceutical agents for in-vivo and in-vitro nuclear medicine studies.

CLRS 480 Applied Radiology Management
Semester course; 3 lecture hours. 3 credits. Prerequisite: Departmental approval. Relates basic concepts in management to the radiologic environment and explores the relationship between the radiologic facility and the health-care system.

CLRS 488 Senior Seminar
Semester course; 1 lecture hour. 1 credit. Prerequisite: Senior standing in department. Designed to allow students to integrate the various individual courses into a single perspective as it relates to the radiation sciences. New developments and timely professional issues will be presented for discussion. Attention is given to underscoring the responsibilities of healt care professionals with emphasis on the need for lifelong learning and participation in professional organizations.

CLRS 492 Directed Study: Radiation Sciences
Semester course; 1-4 credits. Maximum of six credits can apply to graduation requirements. Prerequisite: Permission of department chair. Provides the opportunity for individualized research projects, tutorial studies, special clinical work or other topics not available in formal course work.

CLRS 493 Clinical Education IV
Semester course; 360 clinical hours. 5 credits. Prerequisite: CLRS 395. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain additional practical experience in routine, basic and in advanced procedures. Opportunities for elective clinical rotations are provided.

CLRS 494 Clinical Education V
Semester course; variable clinical hours. 2-5 credits. Prerequisite: CLRS 493. Clinical experience supervised by clinical faculty and affiliate facility staff. Students gain additional practical experience in routine, basic and advanced procedures. Opportunities for elective clinical rotations are provided.

CLRS 498 Senior Project
Semester course; 3 credits. Prerequisites: CLRS 390 and senior standing in department. Provides students the opportunity to explore and investigate a topic of special interest in their area of concentration. Emphasis will be on applying research concepts in the design, implementation and presentation of a project.

Department of Rehabilitation Counseling

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Associate Professor and Interim Department Chair (2002)
B.A. 1983 Northern Illinois University
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Ph.D. 1983 Illinois Institute of Technology

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M.A. 1961 Northwestern University
Ph.D. 1963 Northwestern University
Rule, Warren R.
A.B. 1965 Pfeiffer University
M.A. 1967 Appalachian State University
Ph.D. 1972 University of South Carolina
Wright, Keith C., Professor Emeritus
A.B. 1949 Marshall College
M.A. 1950 Marshall College

* Joint appointment

Undergraduate studies in rehabilitation studies

From 1974 to 1994, the department offered a bachelor of science degree program in rehabilitation services. With the development of national certification groups and licensure laws in most states, professional counseling has become a predominantly graduate-level profession. The department no longer offers the baccalaureate degree in rehabilitation services, but continues to offer the undergraduate courses in rehabilitation services in interdisciplinary cooperation with other majors.

Pathways

Pathways, initiated in the spring of 1996, is a unique interdisciplinary program concentration designed for students from a wide variety of academic departments who are interested in pursuing alcohol and drug rehabilitation studies. A sequence of recommended courses is offered to students who are majoring in psychology, criminal justice, social work, pharmacy, nursing, rehabilitation counseling and other academic and professional disciplines. The sequence of course work depends upon the level of intensity sought by the student, and it may range from only a single introductory course to a complete specialization. Pathways enables students to select a curricular path which matches their substance abuse rehabilitation interest regardless of their discipline. The program is available to undergraduates and is arranged in collaboration with the student's major adviser and/or the director of the rehabilitation substance abuse counselor education concentration.

Courses in rehabilitation services (RHAB)

Courses in rehabilitation services provide a basic understanding of people with mental, physical, cognitive and sensory disabilities and how to help them lead more productive lives. The courses are not only relevant to future graduate study in the profession of rehabilitation counseling, but to a number of other rehabilitation related professions such as clinical and counseling psychology, social work, special education, corrections, therapeutic recreation, occupational therapy, physical therapy and so forth.

Courses are offered in substance abuse rehabilitation at the undergraduate level to prepare the student to meet eligibility requirements for state and national substance abuse counselor certification, but also are available as elective credit, which may be applied toward fulfilling degree requirements or meeting continuing education needs.

One honors course is included in the university honors program in RHAB 202 General Substance Abuse Studies. Interested students should contact the University Honors Program office for further information.

RHAB 201 Introduction to Rehabilitation Services
Semester course; 3 lecture hours. 3 credits. This course has been designed to expose the student to the history and development of the rehabilitation movement. Topics explored include basic concepts and philosophies of rehabilitation, psychological and vocational adjustments of the disabled, and an examination of selected rehabilitation methods.

RHAB 202 General Substance Abuse Studies
Semester course; 3 lecture hours. 3 credits. This course is designed to help the student develop an appreciation of society's attitude about the use of drugs and alcohol, and each individual's responsibility in decisions about the use of drugs. Discussion is offered on specific characteristics of drugs, how addiction occurs and role of rehabilitation after addiction.

RHAB 321 Introduction to Substance Abuse
Semester course; 3 lecture hours. 3 credits. Prerequisite: RHAB 202. Introduction to substance abuse as a progressive family disease with consideration of basic contributing factors (physiological, psychological and sociocultural builds on foundation established in RHAB 202); exposure to multidisciplinary rehabilitative approaches to arresting the disease, as well as some knowledge of intervention; brief mention of the highlights of the continuum of care available in the recovery process.

RHAB 452 Crisis Intervention with the Substance Abuser
Semester course; 3 lecture hours. 3 credits. Prerequisites: RHAB 321, 322, 523 or permission of instructor. Focus on the application of concepts discussed in theory in the recovery process course; sharing of difficulties and successes with crisis intervention by individuals already in the field; provision of new and more refined techniques under the direction of experts demonstrating their applicability.

RHAB 495 Practicum in Rehabilitation
Semester course; 3 credits. Prerequisite: Permission of instructor. Designed to provide opportunities for observation and participation in rehabilitation and related settings. Experiences are systematically related to theoretical concepts.