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Upstate Medical University

The Academic Catalog accurately reflected curricular program requirements and course descriptions at the time of its publication. However, Upstate reserves the right to change the policies, including academic requirements, at any time.

Please see the following resources for additional information:

Academic Calendars:
http://www.upstate.edu/currentstudents/academic/records/calendars.php

Admission requirements, financial aid and tuition and fees:
http://www.upstate.edu/prospective/

The College of Graduate Studies:
http://www.upstate.edu/grad/

The College of Health Professions:
http://www.upstate.edu/chp/

The College of Medicine:
http://www.upstate.edu/com

The Central New York Master of Public Health:
http://upstate.edu/cnymph

The College of Nursing:
http://www.upstate.edu/con/

Student Life – Academic Resources – Support Services – Student Handbook:
http://www.upstate.edu/currentstudents/
SUNY Upstate Medical University

The State University of New York (SUNY) Upstate Medical University encompasses the College of Graduate Studies, College of Health Professions, College of Medicine, College of Nursing, and a clinical system comprising Upstate University Hospital with its downtown and community campuses, the region’s only children’s hospital, and an extensive network of specialty treatment services. Upstate educates physicians, research scientists, nurses, and public health and health care professionals. Upstate also provides graduate medical education, post-doctoral opportunities and a variety of continuing education for health professionals in the region.

Upstate Medical University traces its origins to 1834 when educators founded a medical school at Geneva College to train doctors for communities along the Erie Canal. In 1849, the school gained the distinction of awarding an MD degree to Elizabeth Blackwell, the first woman to graduate with an MD in this country.

In 1871, the medical school dean bought the college’s medical library, anatomical museum, and other tangible assets. He and another Geneva faculty member approached Syracuse University and offered to donate these materials on condition that Syracuse University immediately establish and maintain a medical college consistent with American Medical Association standards. With support from the Onondaga County Medical Society, the Geneva medical faculty joined the Syracuse University College of Physicians and Surgeons, later known as the College of Medicine. In 1875, the new school was the third in the nation to adopt a three-year graded program, preceded only by Harvard Medical School and Chicago Medical College.

In 1936, President Franklin D. Roosevelt laid the cornerstone for a new teaching facility for medical education. This structure, later named Weiskotten Hall after the college’s dean, Herman G. Weiskotten, remains the center of the basic science complex. It houses research laboratories, instructional rooms, the Health Sciences Library and faculty offices.

A program leading to the MS and PhD degrees in biochemistry was initiated in 1947 while the Medical College was still a part of Syracuse University. The program was then incorporated into the Graduate Program of the newly organized State University and expanded to include anatomy, microbiology, physiology and pharmacology, as well as medical technology. Today, the College of Graduate Studies currently offers MS and/or PhD degrees in six biomedical research disciplines.

In 1950, Upstate became part of the State University of New York, a public higher education system that currently includes sixty-four campuses.

The College of Health Professions was added in 1956 and offered a certificate in cytotechnology. The College was officially organized in 1971 to offer associates and bachelor’s degrees in the allied health professions. The college currently offers upper-division and graduate degrees in eight health specialties.

In the late 1970s, the “Clinical Campus” at Binghamton was established. This site offers clinical education programs for third- and fourth-year medical students.

The College of Nursing was established in 1985 with a unique MS degree program for registered nurses and has expanded its offerings to meet the needs of registered nurses in the Central New York region. The College was fully accredited by the National League of Nursing in Fall 1991. It currently offers a BS completion program for RNs, masters programs to become a nurse practitioner, and a DNP program. The College is fully accredited by the Commission on Collegiate Nursing Education.

As the University developed its programs, it also saw great expansion of its physical plant. Growth in the 1960s and 1970s included University Hospital, the Campus Activities Building, Clark Tower residence hall and Jacobsen Hall, which now houses administrative offices. A nine-story addition to Weiskotten Hall, a three-level parking garage, and the Campus West Building were all constructed with both public and private funding.

In 1983, the Regional Oncology Center was built and in 1985 a Pediatric Intensive Care Unit was added to the fourth floor of University Hospital. A day-care center was added in 1991 to meet the needs of Upstate’s students, faculty and staff. The Health Sciences Library was completed in 1995 and the first major expansion of the University Hospital, a $52 million East Wing addition, was completed in 1996. In 2000, the Institute for Human Performance opened to house an array of biomedical scientists, rehabilitation specialists and educators working to reduce the impact of aging, illness and injury. The facility includes the largest block of research space on campus outside Weiskotten Hall, and a major expansion was completed in fall 2013. The Setnor Academic Building opened in the spring of 2007. Expansion of University Hospital to include the Upstate Golisano Children’s Hospital, the only one in the region, was realized in 2009. A new Upstate Cancer Center, the region’s only comprehensive outpatient resource for the treatment of cancer and blood disorders for adults and children, opened in 2014. The New Academic Building opened in 2015 and provides administrative and classroom space for the Colleges of Health Professions and Nursing. A new University Simulation Center will open in the fall of 2018.
By building upon its history and dedication to excellence, Upstate Medical University continues to expand services and to develop resources in virtually every field of medicine, making a major contribution to the quality of life in central New York and beyond.

The mission of SUNY Upstate Medical University is to improve the health of the communities we serve through education, biomedical research and health care.

The vision of Upstate Medical University is “United in expertise, compassion and hope to create a healthier world for all.” The mission and visions are achieved through our shared values. We drive innovation and discovery by empowering our university to bring forth new ideas and to ensure quality; We respect people by treating all with grace and dignity; We serve our community by living our mission; We value integrity by being open and honest to build trust and teamwork and to embrace diversity and inclusion.”

**Accreditation**

The SUNY Upstate Medical University is accredited by the Middle States Commission on Higher Education (MSCHE), 3624 Market Street, 2nd Floor West, Philadelphia, PA 19104, Phone: 267-284-5000. All educational programs are registered through the New York State Department of Education and are approved by the Veterans Administration for the training of veterans under Public Law 98-358. Program specific accreditation is provided by the following:

**College of Health Professions:**
Accreditation Review Commission on Education for the Physician Assistant, Inc. (ARC-PA)
12000 Findley Road, Suite 150
Johns Creek, GA 30097
Phone: 770-476-1224

Commission on Accreditation for Respiratory Care (CoARC)
1248 Harwood Road
Bedford, TX 76021-4244
Phone: 817-283-2835

Commission on Accreditation in Physical Therapy Education (CAPTE)
1111 North Fairfax Street
Alexandria, VA 22314
Phone: 703-706-3245

Commission on Accreditation of Allied Health Education Programs (CAAHEP)
1361 Park Street
Clearwater, FL 33756
Phone: 727-210-2350

Joint Review Committee on Education in Radiologic Technology (JRCERT)
20 North Wacker Drive, Suite 2850
Chicago, IL 60606-3182

Phone: 312-704-5300
National Accrediting Agency for Clinical Laboratory Sciences (NAACLS)
5600 North River Road, Suite 720
Rosemont, IL 60018
Phone: 773-714-8880

**College of Medicine:**
Liaison Committee on Medical Education (LCME)
330 North Wabash Avenue, Suite 39300
Chicago, IL 60611-5885
Phone: 312-464-4933

Middle States Commission on Higher Education (MSCHE)
3624 Market Street, 2nd Floor West
Philadelphia, PA 19104
Phone: 267-284-5000

Council on Education for Public Health (CEPH)
1010 Wayne Avenue, Suite 220
Silver Springs, MD 20910
Phone: 202-789-1050

**College of Nursing:**
Commission on Collegiate Nursing Education (CCNE)
One Dupont Circle NW, Suite 530
Washington, DC 20036-1120
Phone: 202-887-6791

**Discrimination Policy and Title IX**

Pursuant to University policy, the University is committed to fostering a diverse community of outstanding faculty, staff, and students, as well as ensuring equal educational opportunity, employment, and access to services, programs and activities, without regard to an individual’s race, color, national origin, religion, creed, age, disability, sex, gender identity, sexual orientation, familial status, pregnancy, predisposing genetic characteristics, military status, domestic violence victim status, or criminal conviction. Employees, students, applicants or other members of the University community (including but not limited to vendors, visitors, and guest) may not be subject to harassment that is prohibited by law, or treated adversely or retaliated against based upon a protected characteristic.

The University’s policy is in accordance with the federal and state laws and regulations prohibiting discrimination and harassment. These laws include the Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, Title VII of the Civil Rights Act of 1964 as Amended by Equal Employment Opportunity Act of 1972, and the New York State Human Rights Law. These laws prohibit discrimination and harassment, including sexual harassment and sexual violence.

Inquiries regarding the application of the Title IX and other laws, regulations and policies prohibiting discrimination may be directed to the Associate Vice President and Chief Diversity Officer, Office of Diversity and Inclusion, (Gloria
Assignment of Credit Hours

SUNY Upstate Medical University, as part of the State University of New York, has adopted the Carnegie Unit as a measure of academic credit. This is in compliance with the SUNY Policy on Credit/Contact Hour (Document Number 1305) and the United States Department of Education definition of a credit hour as “an amount of work represented in intended learning outcomes and verified by evidence of student achievement.”

Upstate Medical University offers a variety of instruction type of courses, including the standard lecture and laboratory courses. In addition, as an academic health science center, many of our courses are practicums. Each college reviews and approves their own curriculum. However, all follow the format of a standard credit hour awarded for fifteen 50-minute sessions of classroom instruction with a normal expectation of two hours of outside study for each class session. Therefore, a typical three credit hour course at Upstate Medical University meets for three 50-minute sessions per week for a fifteen-week semester, and thus totaling 45 sessions. Another format commonly used is the practicum course, such as our clinical courses. For these courses, credit is awarded as defined by the State University of New York (Document Number 1305) for full-time independent study. Specifically, for clinical courses that meet full-time, one semester credit hour is awarded for each week of the course. For clinical courses that are not full-time, but rather interspersed with other coursework, one semester credit hour is awarded for every forty-five hours of involvement on the part of the student. As an example, a clinical course that meets for nine hours a week over the course of fifteen weeks would be assigned three semester credit hours.

New courses, revisions to current courses, and the programs of study are each approved through their respective college curriculum committee. It is the charge of each of these Committees to review and approve the curriculum in compliance with all federal, SUNY and national accreditation guidelines. In addition, many programs must be individually accredited by their respective professional organizations. Depending on the College, the approval for all curriculum may only rest with the Curriculum Committee or it may also require approval by the faculty organization of the College.

The ultimate authority for the curriculum of each college rests with the dean of the college who ultimately is responsible for ensuring that programs are reviewed periodically. Usually the review of programs and curriculum is an on-going process with reviews occurring annually based on student feedback, changes in the discipline, and updated accreditation standards as published by the professional organizations. Any significant change in a course or a change in a program of study is required to be approved by the respective Curriculum Committee.

General Education Requirements

Both the State University of New York and the Middle States Commission on Higher Education require students in all undergraduate programs to prepare students in a breadth of general education requirements. The general education program must include the study of quantitative and scientific reasoning, written and oral communication, critical analysis and reasoning, information literacy and technological competency, and values, ethics, and diverse perspectives.

On the basis of their upper-division status and relevant accreditation requirements, the Office of the SUNY Provost has waived several SUNY General Education requirements for undergraduate programs at Upstate Medical University. This waiver was granted based on the fact that all bachelor's degree programs are upper division and students enter with prerequisites of 60 credits, having met most of the knowledge and skill areas required by SUNY GenEd. The remaining GenEd requirements will be completed through their program of study at Upstate. The requirement for mathematics is met as a prerequisite requirement in the College of Health Professions, or by taking statistics in the College of Nursing. Other course requirements in the programs fulfill the Gen Ed distribution requirements as follows: Professional Communications, Professional & Technical Writing (Basic Communication), Research Methods, Research in Nursing (Scientific and Critical Reasoning, Information Management), and Health Care Ethics, Ethics, Nursing and the Health Professions (Values, Ethics and Diverse Perspectives).

More information about General Education Requirements at Upstate is available at www.upstate.edu/prospective/basics/suny_gened_requirements.php.
### Degree Programs

<table>
<thead>
<tr>
<th>Programs</th>
<th>Degree Level(s)</th>
<th>Department</th>
<th>HEGIS Code*</th>
<th>CIP Code**</th>
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<tr>
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<td>MS</td>
<td>Cell and Developmental Biology</td>
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<td>Cell and Developmental Biology</td>
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<td>Biochemistry and Molecular Biology</td>
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<td>Respiratory Therapy Education</td>
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<tr>
<td>Cardiovascular Perfusion</td>
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<td>1223</td>
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<td>Medical Imaging Sciences</td>
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<tr>
<td>Medical Biotechnology</td>
<td>BS</td>
<td>Clinical Laboratory Sciences</td>
<td>0499</td>
<td>26.1201</td>
</tr>
<tr>
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<td>BS and MS</td>
<td>Clinical Laboratory Sciences</td>
<td>1223</td>
<td>51.1005</td>
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<td>MD</td>
<td></td>
<td>1206</td>
<td>51.1201</td>
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<td>Microbiology</td>
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<tr>
<td>Microbiology and Immunology</td>
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<td>Microbiology and Immunology</td>
<td>0411</td>
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</tr>
<tr>
<td>Neuroscience</td>
<td>PhD</td>
<td>Neuroscience and Physiology</td>
<td>0425</td>
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<td>Nursing</td>
<td>BS, MS, Post-Master’s Adv. Cert. and DNP</td>
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<td>1203</td>
<td>51.1601</td>
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<td>Pharmacology</td>
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<td>Neuroscience and Physiology</td>
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<tr>
<td>Radiation Therapy Technology</td>
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<td>Cardiorespiratory Sciences</td>
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</table>

* New York State Higher Education General Identification System number
** U.S. Department of Education: Classification of Instructional Programs 2000 number
*** Currently not offered to incoming students
The College of Graduate Studies educates students to be biomedical research scientists, preparing them for careers in academic medical centers, colleges and universities, biomedical research institutes, the biotechnology industry, and government agencies. The College educates graduate students through its six biomedical science programs, awarding PhD degrees and MS degrees as noted:

- Anatomy: MS
- Anatomy and Cell Biology: PhD
- Biochemistry: MS
- Biochemistry and Molecular Biology: PhD
- Microbiology: MS
- Microbiology and Immunology: PhD
- Neuroscience: PhD
- Pharmacology: MS and PhD
- Physiology: MS and PhD

The MD/PhD program at SUNY Upstate Medical University is designed for college graduates who seek the medical training and advanced research skills required for careers in academic medicine and medical research. This eight-year, dual-degree program combines our medical school (College of Medicine) with our graduate school in biomedical sciences (College of Graduate Studies).

Degree and Program Overview

PhD Degree
www.upstate.edu/grad/curriculum/phd_degrees.php

The PhD degree – including research, didactic course work and successful defense of a dissertation – is intended to be completed in four to six years.

First Year: All first-year students participate in three lab rotations of their choosing. Lab rotations give students exposure to diverse research environments and help them select a mentor with whom to do their dissertation research. To help students select their rotation labs, the college offers the Graduate Student Research Opportunities course during the first three weeks. In this course, representatives from each of the six biomedical sciences programs describe the research interests of their faculty members. A faculty advisor also helps students select their rotation labs. All first-year students also participate in a core curriculum designed to provide a broad-based education in the biomedical sciences. The first-year core curriculum courses are: Foundations of Molecular and Cellular Biology, covering fundamental and advanced topics in biochemistry, molecular biology and cell biology; Principles of Biostatistics, introducing the basic principles of biostatistic for research; and Journal Club where students practice analyzing papers and giving oral presentations. Beginning in January, students take electives. By the end of the spring semester, students begin focusing on research. Students select a mentor and become affiliated with their mentor's degree granting program at the end of the first year.

Second Year: By the start of the second year, most PhD students have begun work on the research project that will lead to their dissertation. During this year, students take the Responsible Conduct of Scientific Research course, which examines research ethics and the moral and philosophical issues confronting scientists, and continue to take electives based on their research interests as well as courses required by their program. All students take a program specific grant-writing course. Students pass a qualifying exam to become candidates for the doctoral degree. This exam is scheduled by the end of the second year.

Later Years: In their second year, students put together a dissertation advisory committee, comprised of three to six faculty members from different departments. The committee meets every six months to review the student's progress, make suggestions and provide direction. To assist in the guidance of a student’s career planning, the student and advisor develop a career development plan which is updated and shared annually with the advisory committee to help a student meet their planned goal. After completing their research projects, students write a dissertation and defend it before a dissertation defense committee.

Master’s Degree
www.upstate.edu/grad/curriculum/masters.php

The master's degree program typically takes two to three years to complete. Master's students participate in selected parts of the core curriculum along with PhD students. However, unlike PhD students who usually affiliate with a degree-granting program at the end of their first year, master's students join a degree-granting program from the start. Master's students write and defend a thesis, but they do not take a qualifying exam. Additional requirements for master's students vary depending on the department. M.S. students are required to take one core course in the second year: GS637 Responsible Conduct of Scientific Research – 1 credit. Additional required courses are determined by the degree granting program and the advisor.

MD/PhD Program
www.upstate.edu/mdphd/curriculum/index.php

Upstate Medical University’s MD/PhD Program is designed for individuals interested in pursuing a career as physician-scientists in academic medicine. During the students first two years of training, students complete required courses in the College of Medicine curriculum (see College of Medicine section of the Academic Catalogue). They then advance into the laboratory where they spend three to four years completing...
additional coursework and dissertation research under the guidance of one of the faculty members in College of Graduate Studies. The time in the laboratory culminates with the defense of the doctoral dissertation, after which students re-enter the College of Medicine to complete their training in the required clinical clerkships and electives. The total time spent in the program should be no more than eight years. Throughout the training students will also participate in MD/PhD specific coursework and activities.

Annual stipends and tuition scholarships are provided for students during enrollment in the MD/PhD program.

MD/PhD students may receive up to but no more than 12 elective credits in the College of Medicine (COM) for research which will count toward fulfilling the COM graduation requirement of 25 elective credits. MD/PhD students must apply for this research credit; please see the Student Handbook for details. Alternatively, MD/PhD students are eligible to apply up to 9 credits from the Grand Rounds Course towards College of Medicine elective credits.

There can be 24 credits transferred from the COM to the College of Graduate Studies (CGS). These credits are based on criteria set forth by the Graduate Programs, the Dean of College of Graduate Studies, and the MD/PhD Program Co-directors. The courses transferred are those that fulfill the CGS core curriculum and typically ones that correlate with the degree-granting program you choose.

The MD/PhD Grand Rounds course is a required course for all students in all years of the program. MD/PhD students in the first year of their PhD are required to take the MD/PhD grant writing course.

Prior to graduation from the program each student must have at least one accepted first-author publication of experimental data from their dissertation work in a peer-reviewed journal.

**General Graduate Studies Course Descriptions**

**Core Curriculum**

**GS604 Graduate Student Research Opportunities (0 Credit Hours):** With one full afternoon per program, each of the six Ph.D. training programs will describe its currently active research projects. This description will be presented in a format which the program’s faculty feels best displays all its research activities. Two major goals of these presentations are to: 1) acquaint the incoming graduate students with the breadth of research being pursued within each graduate program, and 2) to thereby give the incoming graduate students further information upon which to base their own choice of research area and advisor for their dissertations.

**GS612 Biomedical Sciences Laboratory Rotations (2 Credit Hours/Rotation):** The purpose of the rotation is to learn new research skills and more about the research of a potential dissertation advisor, and to potentially lay the groundwork for a future dissertation. Biomedical Sciences PhD students are required to do three laboratory rotations, taken consecutively, in the first year. Rotations begin approximately September, January and March. An optional fourth rotation in the summer may be taken. MD/PhD students are required to do two laboratory rotations, one each summer prior to their medical school years one and two (an optional third rotation may be taken). Written report due to Advisor at the end of each rotation. The grading for laboratory rotations is satisfactory/unsatisfactory.

**GS616 Foundations of Molecular and Cellular Biology (4 Credit Hours):** This course provides a comprehensive background for students in the Biomedical Sciences Program. It covers fundamental and advanced topics in biochemistry, molecular biology, and cell biology. Lectures and discussions are based on primary research articles, reference books, and lecture notes. Major divisions of the course are 1) properties of biomolecules, 2) cell organization and regulation, and 3) cell function.

**MPH602 Principles of Biostatistics (3 Credit Hours):** This course introduces the basic principles of biostatistics and requires students to apply these principles to describe and analyze health data. Topics include descriptive statistics, probability distributions, point and interval estimation of population parameters, and hypothesis testing. A variety of one and two-sample tests for continuous and categorical data are covered, as is analysis of variance and linear regression modeling. Equal attention is given to manual calculation and use of statistical software; students will learn to analyze data using SPSS software and interpret output and results.

**GS637 Responsible Conduct of Scientific Research (Research Ethics) (2 Credit Hours):** The faculty instructors participate in lecture and discussion with the students. The class meets 2 hours per week for 15 weeks. The lecture topics include Authorship, Peer Review and Plagiarism, Conflicts of Interest, Policies on Research Misconduct, Human Subjects, Animal Subjects, and Intellectual Property.

**GS892 Introduction to the Presentation and Analysis of Scientific Literature: Journal Club (1 Credit Hour):** This course gives students the opportunity to read, critically evaluate, and present research articles in a variety of fields. During this course students are expected to develop a high standard of scientific analysis and good public presentation skills. Students will be required to present one to two paper(s) each semester depending on time availability and to actively participate in class discussions when not presenting. This course is required for all first year graduate students in the fall semester, but, if space is available, it is also offered as an elective for advanced students.
Biochemistry and Molecular Biology Program and Degree Requirements

CIP Code: 26.0202

This program awards:
- PhD in Biochemistry and Molecular Biology
- MS in Biochemistry

Faculty researchers in Biochemistry and Molecular Biology seek to understand the molecular and cellular bases of human health and disease. They apply a broad range of tools ranging from those of structural biology and biophysics to cell biology and genetics. Faculty with expertise in X-ray crystallography, single-molecule electron microscopy, and spectroscopy investigate protein structure, folding, and interactions at the atomic level. Other faculty members employ modern genetics and genomic technologies to integrate the above information with in vivo studies to generate a broader understanding of cellular pathways and systems biology. This comprehensive strategy is reflected by the diverse approaches that our researchers take, from high-resolution structural and single-molecule studies to the use of animals and single-celled organisms to model disease processes and development.

Areas of focus in the Department of Biochemistry and Molecular Biology include membrane and transport protein structure and function, DNA replication and transcription, cellular responses to stress, epigenetics and energy metabolism. These studies impact disorders from cancer to neurodegenerative diseases to pathogenic infections. Our program boasts a robust and long-standing record of extramural funding, particularly from the National Institutes of Health.

PhD Degree Requirements:

Required Graduate Courses:
GS616 Foundations of Molecular and Cellular Biology
MPH602-002 Principles of Biostatistics
GS637 Responsible Conduct of Scientific Research
B609 Biochemistry & Molecular Biology Rotations OR
GS612 Biomedical Sciences Laboratory Rotations
GS604 Graduate Student Research Opportunities
GS892 Introduction to the Presentation and Analysis of Scientific Literature: Journal Club
B620 Biochemistry Seminars
B648 Research Design in Biochemistry & Molecular Biology
B650 Scientific Writing

Advanced Courses: At least 6 credits of Advanced Biochemistry & Molecular Biology Courses are required. (Note: GS628 Systems Biology of Genetics, Genomics, and Proteomics and PHA615 Apoptosis and Cancer Pharm. are considered advanced Biochemistry & Molecular Biology courses for this purpose).

Total Didactic Graduate Courses - minimum of 30 credit hours.

Qualifying Examination (to be scheduled before or during the summer following the student’s second year)

Dissertation Committee Meetings and Department Research Talk (minimum of two meetings per year)

Successful Dissertation Defense

MS Degree Requirements:

Required Graduate Courses:
GS616 Foundations of Molecular and Cellular Biology
GS637 Responsible Conduct of Scientific Research
B609 Biochemistry & Molecular Biology Rotations
GS892 Introduction to the Presentation and Analysis of Scientific Literature: Journal Club
B620 Biochemistry Seminars

Advanced Courses: At least 3 credits of Advanced Biochemistry & Molecular Biology courses are required.

Total Didactic Graduate Courses (minimum of 20 credit hours)

M.S. Thesis Committee Meetings (minimum of one meeting per year)

Successful Dissertation Defense

Course Descriptions

B609 Biochemistry & Molecular Biology Rotations (2 Credit Hours): This laboratory course is primarily intended for Biochemistry graduate students. The course will provide instruction in laboratory techniques commonly used in biochemical and molecular biological laboratories and will aid students in the selection of a research advisor. This course is offered year round. Research areas covered span the interests of Biochemistry and Molecular Biology program faculty. The grading for laboratory rotations is satisfactory/unsatisfactory.

B617 Methods of Biochemistry and Molecular Biology Research (Variable Credit): Course deals with individualized laboratory experience. Topics agreed upon by student and faculty sponsor. Often taken between rotations and Thesis research to fulfill credit requirements.

B620 Biochemistry Seminar (0 Credit Hours): Presentations of recent research activities by invited speakers and department members.

B638 Independent Study in Biochemistry and Molecular Biology (1 – 2 Variable Credit): A tutorial course designed for graduate students in biochemistry, or related disciplines that will involve in-depth review of recent developments in biochemical research. May include 1) literature searches, 2) seminar and/or lectures, 3) hands on experience with new techniques available in the department, and 4) a written report.
The purpose of the course is to develop a broad knowledge of the biochemical literature as the student advances in his/her more defined research goals.

**B647 Gene Expression and Epigenetic Regulation (2 Credit Hours):** Gene expression is a fundamental process in all living organisms. Regulation of gene expression determines cell type during development and is required for cells to carry out their functions in response to nutritional, hormonal and environmental signals. At the heart of gene expression is the process of transcribing DNA into RNA. In this course, we will discuss the detailed mechanisms of transcription with a particular emphasis on the role of epigenetic modifications of chromatin in the regulation of transcription. We will use knowledge obtained from the study of a variety of model organisms to illustrate the basic concepts that are conserved throughout evolution, including (but not limited to) the role of histone modifications, chromatin remodeling, the CTD code, non-coding regulatory RNAs, and mechanisms of cell memory. In addition, we will discuss the role of epigenetic mechanisms in imprinting, iPSC cell reprogramming, and human disease. The course is organized into both lecture and discussion groups, with opportunities for student participation and presentations. Readings will include contemporary studies from the published literature. No textbook is required.

**B648 Research Design in Biochemistry & Molecular Biology (3 Credit Hours):** This course promotes the development of critical thinking, experimental designing and scientific writing important to the students’ future career as scientists. The students will gain experience in developing an original dissertation research project and preparing the plan in a formal hypothesis-based research proposal. Students will learn the essential features of grant writing, with the emphasis on developing skills necessary for effectively communicating their research design.

**B650 Scientific Writing in Biochemistry (1 Credit Hour):** This course is required in the second year for all students performing their thesis research in the Department of Biochemistry and Molecular Biology. The purpose of this course is to provide practice and one-on-one instruction in scientific writing. Each week the student will be assigned a paper to read from the primary literature by one of the program members, usually in the faculty member’s area of expertise. The student will have one week to read the paper and write a concise one page summary and critique of the paper. In the second week, the student will revise the paper, with the direct guidance and final approval of that faculty member.

**B664 Protein Sorting and Vesicular Trafficking (1 Credit Hour):** The current literature will be used to analyze recent discoveries and controversies in protein sorting and trafficking. After an initial review of core material related to the topic, students will be assigned papers to read in advance of each class along with questions to think about in relation to the reading assignment. Each class will then consist of a student presentation of the assigned paper(s) and class discussion of the readings. Grading is based on presentation and class participation.

**B665 Bioenergetics and Metabolism (2 Credit Hours):** Using both lecture and student-driven discussions, basic principles of bioenergetics and metabolism will be discussed and applied in a variety of disease states.

**B666 Protein Structure Determination (2 Credit Hours):** The primary literature will be used to cover advanced topics in determination of protein structure and dynamics. Topics include characterization of protein structure and dynamics by X-ray crystallography, nuclear magnetic resonance, spectroscopy, cryo-electron optical super resolution microscopy, and fluorescence spectroscopy, mass spectrometry, and computational methods. Emphasis is placed on how structure and dynamics of proteins relates to their function and mechanism.

**B700 Research in Biochemistry (Variable Credit):** Original thesis research in the field of Biochemistry under the supervision of a member of the staff.

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**Cell and Developmental Biology Program and Degree Requirements**

**CIP Code: 26.0601**

This program awards:
- PhD in Anatomy and Cell Biology
- MS in Anatomy

Research in the Department of Cell and Developmental Biology explores the molecular and biochemical mechanisms of cellular function and development. Faculty researchers in the department have funding for fundamental studies of: proteins and structures responsible for the assembly and dynamics of myofibrils; the genetics and cell biology of heart formation; the role of class I myosins in kidney functions; the mechanisms of actin assembly during endocytosis; the role of cell adhesion in regulating the cytoskeleton and cell motility in normal and cancerous cells; integrin regulation of the actin cytoskeleton; research on neural plasticity and spinal cord injury; the role of formins in the assembly of the actin cytoskeleton; the identification of genes important for the assembly and motility of cilia; the interface between cytoskeletal dynamics, mitotic signaling, and membrane transport during cell division. Models used in the research include: zebrafish, avian embryos, the alga *C. reinhardtii*, cell culture lines, *C. elegans*, the yeast *S. pombe*, rats and mice. Students and faculty use a variety of research methods including sophisticated light microscopy (laser scanning confocal microscopy, spinning disc confocal microscopy, wide field deconvolution imaging, real-time fluorescence microscopy, TIRF microscopy), high-sensitivity digital cameras and image processing, electron microscopy, tissue culture, stereotactic surgery, and a complete range of molecular and biochemical techniques.
**PhD Degree Requirements:**

**Required Graduate Courses:**
- GS604  Graduate Student Research Opportunities
- GS605  Grant Writing
- GS612  Biomedical Sciences Lab Rotations (x3)
- GS616  Foundations of Molecular and Cellular Biology
- MPH602-002  Principles of Biostatistics
- GS637  Responsible Conduct of Scientific Research
- GS892  Introduction to the Presentation and Analysis of Scientific Literature: Journal Club

**Elective Suggestions:**
- GS628  Systems Biology of Genetics, Genomics, Proteomics
- A505  Gross Anatomy
- A507  Introduction to Neuroscience
- A517  Microscopic Anatomy
- A613  Graduate Cellular Anatomy
- A614  Contemporary Cellular, Molecular, and Developmental Biology
- A621  Neuroanatomy Lab
- A622  Developmental Biology
- B647  Gene Expression and Epigenetic Regulation
- B664  Protein Sorting and Vesicular Trafficking
- B666  Protein Structure Determination
- N620  Advanced Topics in Receptors and Cell Signaling
- N623  Systems Neuroscience
- PHA615  Apoptosis and Cancer Pharmacology
- PHA621  Cancer Biology and Therapeutics

Total Didactic Graduate Courses (minimum of 30 credit hours):
- Department Seminar Series (attendance required at all seminars)
- Successful Qualifying Examination

**Course Descriptions**

**A505  Gross Anatomy** (9 Credit Hours): The study of anatomical structures and systems and their functions are studied primarily through dissection supplemented with comprehensive lectures aligned with daily laboratory assignments. Pathological and age-related changes in organs are observed and the results of surgical procedures are discussed and correlated with disease processes. Pertinent developmental anatomy is presented to enhance understanding of normal adult structures and of common congenital defects. Radiographic images presented in online case studies provide an opportunity to use anatomical knowledge in a clinical reasoning and problem solving.

**A507  Introduction to Neuroscience** (3 Credit Hours): The Systems Neuroscience course will consist of the Neuroscience course given to first year medical students, without the neuroanatomy components. This course will include the study of systems of neuroscience, including sensory, motor, limbic systems, sleep and awakening, and basic cognitive processing. There are a total of 29 lectures with 2 essay examinations. The summer session will be a combination of video presentations and live tutorials. There will be 2 essay/multiple choice exams.

**A613  Graduate Cellular Anatomy** (2 Credit Hours): Graduate Cellular Anatomy provides an opportunity for graduate students to independently visualize cells, tissues, and organs of the human body by direct light-microscopic observation of prepared histologic specimens and develop their teaching and presentation skills. Introductory lectures on the histology of the basic tissue types will be followed by a guided laboratory session where each student will use their own university microscope to explore these tissue types. Course participants will select organ systems of interest and prepare presentations on the histology of those organ systems and present it to the class. Student presentations will also be followed by a laboratory session for students to explore that organ system.

**MS Degree Requirements:**

**Required Graduate Courses:**
- GS637  Responsible Conduct of Scientific Research
- Additional courses determined in consultation with advisor (see elective suggestions below)

**Elective Suggestions:**
- GS605  Grant Writing
- GS616  Foundations of Molecular and Cellular Biology
- MPH602-002  Principles of Biostatistics
- GS628  Systems Bio of Genetics, Genomics Proteomics
- GS892  Introduction to the Presentation and Analysis of Scientific Literature: Journal Club
A614 Contemporary Cellular, Molecular and Developmental Biology (2 Credit Hours): Lectures, student presentations, and discussions dealing with cellular and molecular mechanisms during embryonic development. Classical as well as contemporary concepts will be emphasized.

A615 Special Topics in Anatomical Sciences (Variable Credit): Advanced work in any sub-discipline of anatomical sciences such as developmental biology, cellular biology and fine structure, gross anatomy, and neurosciences.

A615.5 Teaching in Graduate Cellular Anatomy (2 Credit Hours). Prerequisite: Students must have successfully completed either Microscopic Anatomy (A517) or Graduate Cellular Anatomy (A613). This course will provide an opportunity for graduate students to teach a graduate level course through assisting the faculty instructors of Graduate Cellular Anatomy.

A617 Methods of Cell & Developmental Research (Variable Credit): Methods of research used by the faculty are demonstrated. Problem design and research methods emphasized.

A621 Neuroanatomy Lab (2 Credit Hours): Using a case-based format, this course will provide students an appreciation for the structure and three-dimensional organization of the central nervous system including external and internal anatomy of the central nervous system, functional organization and interconnections of the major brain pathways.

A622 Developmental Biology (2 Credit Hours): This is an introductory graduate course in developmental biology. The course will have two 90-minute sessions per week for 10 weeks. The format will be a mix of lectures and discussion sessions led by the faculty that cover fundamental concepts in developmental biology. Readings will be assigned from the textbook and journal articles. A weekly quiz will assess student comprehension of assigned readings and spark discussion. Grades will be based on performance on quizzes and participation in class discussions.

A623 Grant Writing in Cell and Developmental Biology (2 Credit Hours). Faculty will provide an overview of grant writing style and mechanics and provide examples of grants written in common formats for private and government agencies. Students will write their own grants, limited to ten pages, excluding Abstract and Bibliography, and otherwise following the style of the current NIH R01 grant. Each mentor-student pair may follow their own timetable towards completion by semesters end. Students and mentors are encouraged to review writing progress and provide feedback frequently.

A700 Research in Cell & Developmental Biology (Variable Credit): Original dissertation research in anatomical sciences under supervision of a staff member.

Microbiology and Immunology
Program and Degree Requirements
CIP Code: 26.0501

This program awards:

- PhD in Microbiology & Immunology
- MS in Microbiology (currently not offered to incoming students)

Major research areas in the Department of Microbiology and Immunology are in diseases caused by viruses, the host response to infection, and the development and function of the immune system. A range of viruses are studied, including dengue virus, cytomegalovirus, varicella zoster virus, and Zika virus. The focus of virology research is on pathogenesis, gene regulation, molecular interactions between the virus and host cell, and antiviral agents. Immunology research focuses on autoimmune diseases and the role of innate and adaptive immune responses in development, infectious disease and cancer. A major focus of our immunology research is immunoreceptor signaling. Research is conducted at the molecular, biochemical, genetic and population levels with goals of developing vaccines and therapeutics of infectious diseases and cancer.

PhD Requirements:

Required Graduate Courses:
First and Second Years:
GS604 Graduate Student Research Opportunities
GS612 Biomedical Sciences Laboratory Rotations (1st rotation)
GS616 Foundations of Molecular and Cellular Biology
MPH602-002 Principles of Biostatistics
GS612 Biomedical Sciences Laboratory Rotations (2nd rotation)
GS612 Biomedical Sciences Laboratory Rotations (3rd rotation)
GS892 Introduction to the Presentation and Analysis of Scientific Literature: Journal Club
GS637 Responsible Conduct of Scientific Research
M627 Intro to Virology
M628 Intro to Immunology
*M616 Current Concepts in Virology
*M610 Problems in Cell and Molecular Immunology
M630 Seminar in Microbiology and Immunology
M623 Directed Individual Study in Micro. and Immuno. Research variable
M609 Grant Writing in Microbiology & Immunology

Third Year & Following Years:
M700 Research in Microbiology & Immunology
M630 Seminar in Microbiology & Immunology

* Students must take either 6 credits of both M616 and M610 or 3 credits of one of these advanced courses plus 3 credits of
another advanced course offered by College of Graduate Studies degree-granting programs.

Qualifying Examination – to be scheduled by the end of the second year.

Dissertation Advisory Committee - The committee must meet at least twice per year during the dissertation research period, and committee must sign-off on student’s readiness to write & defend dissertation.

Submission of First-Author (or Co-First-Author) Research Paper: Students in Microbiology & Immunology are required to submit at least one first-author or co-first-author research paper for publication prior to the Dissertation Defense.

Successful Dissertation Defense

**MS Requirements (currently not offered to incoming students):**

**Required Graduate Courses:**
- GS616 Foundations of Molecular and Cellular Biology
- GS637 Responsible Conduct of Scientific Research
- M627 Intro to Virology
- M628 Intro to Immunology
- *M616 Current Concepts in Virology
- *M610 Problems in Cell and Molecular Immunology
- M630 Seminar in Microbiology and Immunology
- M623 Directed Individual Study in Micro and Immunology Research

**Electives:**
- M609 Grant Writing in Microbiology and Immunology Introduction to Applied Biostatistics and Research Design

*Either M616 or M610 is required.

Successful Thesis Defense

**Course Descriptions**

**M609 Grant Writing in Microbiology and Immunology** (3 Credit Hours): Students will learn the essential features of writing research proposals, with an emphasis on the requirements of the NIH. In the first half of the course the principles of clear, unambiguous writing will be presented in lectures, accompanied by analysis of good and bad examples. In the second half of the course the students will meet regularly with the course instructor to review their assignments, which will then be revised as necessary in the final sessions of the course the students will meet as a group to review and discuss each other’s proposals.

**M610 Problems in Cellular and Molecular Immunology** (3 Credit Hours): This course will be run in a tutorial/seminar format with three 1.5 hour sessions per topic with a total of 10 topics. The first session will be an overview of the topic. The second session will be a discussion of 2-4 papers in the topic area. The third session will discuss student answers to research problems in the topic area. Topics could include: Mechanisms of Generation of Variability; Recognition by the T-Cell Receptor; Regulation of Immune Recognition in the Nervous System; Lymphocyte Activation Cascades; Immunotherapy for Cancer; Viral Immunomodulation; Immunological Memory; Cytokines in Rheumatoid Arthritis.

**M616 Current Concepts in Virology** (3 Credit Hours): The structure, function and replication of important virus groups will be studied. Current research topics and techniques will be reviewed, with an emphasis on molecular biology and viral pathogenesis. Time, day, and location TBA.

**M623 Directed Individual Study In Microbiological and Immunological Research Methods** (Variable Credit): This is a special research training program designed to acquaint students with specific areas of research and/or use of methods, techniques, or instrumentation, as well as to introduce students intensively to the laboratory, and research approaches.

**M630 Seminar in Microbiology and Immunology** (1 Credit Hour): Faculty and students will present their research work, in a selected subject area. Meetings will be once a week lasting 60 minutes per session. Grading will be based upon participation and oral contributions to discussion, as well as individual presentations.

**M626 Methods of Microbiology and Immunology Research** (Variable Credit): Methods of Research used by the faculty are demonstrated. Problem design and research methods are emphasized. Course deals with individualized laboratory experience. Topics agreed upon by student and faculty sponsor.

**M627 Introduction to Virology** (2 Credit Hours): This is an introductory course in virology for graduate students. The objectives are to understand the structure and characteristics of viruses, their replication, interactions with the host, and applications in biomedical science. The material will be presented as lectures and in discussion of primary research articles.

**M628 Introduction to Immunology** (2 Credit Hours): This course is intended to be an introductory course in immunology for graduate students. The course goal is to develop a general understanding of immunology including both adaptive and innate immunity. Sixteen lectures will present basic concepts in immunology. In addition there will be 14 sessions in which a journal article will be discussed which relates to the topic of the preceding lecture.

**M629 Microbial Pathogenesis** (2 Credit Hours): The objective of the course is to provide students with an understanding of the mechanisms of bacterial pathogenesis and an appreciation of the continuing and serious impact of bacterial disease on modern life. Students will learn basic principles of bacteriology and parasitology and the scope of bacterial colonization of both humans and the environment.
Mechanisms of microbial pathogenesis and intervention strategies will be discussed. Finally, students will gain an understanding of the research priorities in this field.

M700 Research in Microbiology (Variable Credit): Original research in microbiology for the master’s thesis or doctoral dissertation.

Neuroscience Program and Degree Requirements
CIP Code: 26.0608

This program awards:

- PhD in Neuroscience

The Neuroscience Graduate Program is a multidisciplinary program divided into three areas: Cell and Molecular Neuroscience, Development and Regeneration, and Systems Neuroscience. Program research relates to many human diseases and disorders, including fetal alcohol syndrome, retinitis pigmentosa, spinal cord injury, Alzheimer’s, multiple sclerosis, cerebral palsy and amyotrophic lateral sclerosis (ALS). Research in Cell and Molecular Neuroscience group the regulation of gene expression in the nervous system, mechanisms of cell signaling and excitability within cells, and the molecular bases of neurological disease and disorders. Research topics in Development and Regeneration include the development of the mammalian cortex, regulation of gene expression during development, neuronal stem cells in the CNS and the eye, and mechanisms of regeneration in the retina, and the spinal cord. Research in Systems Neuroscience focuses on the neural mechanisms that underlie the functions of the olfactory system, the visual system, and motor systems in health and disease. Students can take advantage of a collaborative neuroscience program with neighboring Syracuse University.

PhD Requirements:

Required Didactic Courses (minimum of 30 credits): The didactic credits requirement is satisfied through 15 credits of required GS coursework and 15 or more credits of Neuroscience courses (up to 2 credits of non-NS courses are accepted without petition).

Required Courses (including GS credits):
- GS604 Graduate Student Research Opportunities (Fall, yr. 1)
- GS612 Biomedical Sciences Laboratory Rotations OR N675 Research Rotations in Neuroscience (Fall and Spring, yr. 1)
- GS616 Foundations of Molecular and Cellular Biology (Fall, yr. 1)
- MPH602-002 Principles of Biostatistics (Fall, yr. 1)
- GS892 Introduction to the Presentation and Analysis of Scientific Literature: Journal Club Fall, yr. 1)
- GS637 Responsible Conduct of Scientific Research
- N507 Intro to Neuroscience (Spring, yr. 1) OR N601 Neuroscience (Spring, yr. 1)
- N623 Systems Neuroscience (spring, yr. 1)
- N629 Scientific Writing in Neuroscience (Fall, yr. 2)
- N627 Grant Writing in Neuroscience (Spring, yr. 2)

Electives:
- N602 Cell Physiology of excitable cells (same as PHA602 and PHY602)
- N610 Topics in Developmental Neurobiology
- N616 Topics in Vision I
- N617 Methods in Neuroscience Research
- N618 Topics in Vision II
- N619 Neurobiology of Disease
- N620 Advanced Topics in Receptors and Cell Signaling
- N621 Neuroanatomy Lab (same as A621)
- N628 Neurobiology of Addiction
- N630 Independent Study in Neuroscience
- N631 Topics in Neuroscience (only open to 1st Year students)
- N633 Advanced Topics in Stem Cell Research I
- N634 Advanced Topics in Stem Cell Research II
- N635 Neurophysiology of Methods
- N653 Topics in Cellular and Molecular Neurobiology

Each student in the Neuroscience Graduate Program is required to attend the complete seminar series and to present a seminar to the members of the Program each year.

Qualifying Examination – to be scheduled by the end of the second year.

Successful Dissertation Defense

Course Descriptions

N507 Introduction to Neuroscience (3 Credit Hours): The Systems Neuroscience course will consist of the Neuroscience course given to first year medical students, without the neuroanatomy components. This course will include the study of systems of neuroscience, including sensory, motor, limbic systems, sleep and awakening, and basic cognitive processing. The summer session will be a combination of video presentations and live tutorials. There will be 2 essay/multiple choice exams.

N601 Neuroscience (3 Credit Hours): Detailed analysis of the anatomy, physiology, and chemistry of the nervous system and behaviors that it mediates. Topics include neurons and electrochemical properties of neurons, sensory and motor systems, homeostasis, sleep consciousness, learning, and memory.

N602 Cell Physiology of Excitable Cells (2 Credit Hours): This course will present and discuss key concepts of ion channel function and how they relate to the cell physiology of excitable cells. The Instructor(s): will present Discussion topics on Review of Electricity and Action Potentials, the Hodgkin-Huxley model for the nerve action potential, theories for electrodiffusion and ion permeation, and visual transduction. The remainder of the course will be primarily
student led discussions of selected chapters from the Cell Physiology Sourcebook covering concepts of Ion Channel Structure, Function, Regulation, and Channelopathies (human diseases caused by ion channel dysfunction).

**N610 Topics in Developmental Neurobiology (2 Credit Hours):** This course is a full semester course in the fall semester. It is offered every year. The course meets on MWF for an hour each session and is organized so that lectures will be given on Mondays and Wednesdays during each week. Fridays will typically be a reading day with the discussion of the paper taking place within the last class on that day. There will be a midterm and final exam given in this course. This course will provide extensive, yet selective, exposure to major issues and events in the development of the nervous system. Topics include Axis determination and early patterning, Developmental signals and gene regulation, Cell generation/proliferation, Cell migration and guidance, Cell death, Synaptogenesis, and Plasticity.

**N616 Topics in Vision I (2 Credit Hours):** The course will examine neuroanatomical, electrophysiological, and psychophysical aspects of vision. This is primarily a readings course, with emphasis on original literature. It is particularly appropriate for graduate students intending to conduct original research in the visual system. This first half will focus on visual mechanisms at the level of the retina, and will be offered on odd numbered years.

**N617 Methods of Neuroscience Research (2 Credit Hours):** Survey of research methods in NS. Course will include modules on the study of gene expression, morphology of neurons and glia cells, neuronal and glial function, behavior, networks, inheritance, etc. Emphasis is on experimental design, research protocols and data interpretations. Most modules will include both study of theory and actual hands-on practice through in-lab demonstrations of research methods.

**N618 Topics in Vision II (2 Credit Hours):** The course will examine neuroanatomical, electrophysiological, and psychophysical aspects of vision. This is primarily a readings course, with emphasis on original literature. It is particularly appropriate for graduate students intending to conduct original research in the visual system. This second half will focus on visual mechanisms beyond the level of the retina, focusing on the cortical contributions to visual processing and visually guided behavior.

**N619 Neurobiology of Disease (2 Credit Hours):** Neurobiology of Disease will meet twice per week, Mondays and Fridays, 2:00 – 4:00 P.M. Each meeting will focus on one disease where some of the molecular underpinnings are understood (e.g. Alzheimer’s Disease). A basic scientist will conduct the class, introducing the molecular mechanism of the disease and leading the class in discussions of an important research paper on the disease.

**N620 Advanced Topics in Receptors and Cell Signaling (1 Credit Hour):** This advanced course will cover a topic in receptors and cell signaling; for example, G-protein-coupled receptors, integrins and cell adhesion, glutamate receptor signaling and LTP, CDKs with emphasis on the neural-specific CDK5, ras signaling and tyrosine kinase-linked receptors, scaffolding proteins. Topics will be covered by a combination of graduate student-specific lectures and tutorials, based on current research papers and associated reviews. Each topic will also include a take-home essay-type examination. Although it is not required, it is highly recommended that this course be taken in sequence with 619PHA-Autonomic Pharmacology.

**N621 Neuroanatomy Lab (2 Credit Hours):** Using a case-based format, this course will provide students an appreciation for the structure and three-dimensional organization of the central nervous system including external and internal anatomy of the central nervous system, functional organization and interconnections of the major brain pathways.

**N623 Systems Neuroscience (3 Credit Hours):** An exploration of issues and themes in systems neuroscience, focusing on the cooperativity of neurons in circuits, ensembles, representations and pathways, leading to sensation, perception, information processing, cognition and behavior. Course format includes lectures and discussion. Readings include selected textbook chapters and reviews as well as in-depth analysis of original literature. This is an introductory graduate level course that does not assume prior exposure to systems neuroscience beyond the level of N507.

**N627 Grant Writing Course in Neuroscience & Physiology (3 Credit Hours):** The primary goal of the course is to teach grant writing and critical thinking skills using the current NIH format for predoctoral fellowships. The course is divided into 3 sections: a brief series of informational lectures about the NIH peer-review process and application materials. In section 2, students will develop their specific aims page through a series of one-on-one interactive meetings with the course coordinators. In section 3, students will work closely with the course coordinators as well as their mentors to develop the main body of the proposal based on their specific area of study.

**N628 Neurobiology of Addiction (2 Credit Hours):** Overview of the neuroanatomy and molecular neurobiology underlying addiction. Students will interactively learn and discuss the neurobiological basis of many drugs of abuse and addictive behavior.

**N629 Scientific Writing in Neuroscience (1 Credit Hour):** This course is required in the second year for all students performing their thesis research in the Neuroscience program. The goal of the course is to develop writing skills, by providing practice and one-on-one instruction in scientific writing. There will be formal class meetings with the instructor for 90 minutes each week for the first part of the course (4 meetings). The student will read from the primary literature and write concise summaries and critiques of the papers. Student will revise the paper, with the direct guidance and final approval of the faculty member.
N630 Independent Study in Neuroscience (1 – 3 Credit Hours): A tutorial course designed for graduate students in neuroscience that provides an in-depth look at a field of neuroscience research. Course will include: 1.) Literature survey, 2.) Seminar and/or lectures, 3.) In-depth critique of literature and/or experimental techniques. Fulfillment of the course requires a written report. The purpose of the course is to develop in-depth knowledge of a field of NS research as a student continues to make progress towards his/her research goals.

N631 Topics in Neuroscience (1 Credit Hour): A survey course of current research in neuroscience. Members of the Neuroscience Faculty will present specific subfields of NS research focusing on major questions and recent progress. Course will combine a basic introductory lecture (focused on major questions and techniques) with a discussion session to go over a recent research paper. Students will be required to submit written questions for, and actively participate in, the discussion session. The purpose of the course is to familiarize incoming students with major research questions and experimental approaches in NS research.

N633 Advanced Topics in Cell Research I (1 Credit Hour): The course covers topics in stem cell (SC) research emphasizing seminal findings and recent progress through a combination of lectures and student presentations accompanied by discussion of research papers. Class (2 hours) meets once a month.

N634 Advanced Topics in Stem Cell Research II (1 Credit Hour): Offered concurrently with N633. Activities and requirements same as N633, plus N634 students will give a main introductory lecture on one of the model systems under guidance of the faculty member with expertise in the chosen topic.

N635 Neurophysiology Methods (2 Credit Hours): This course will provide a concise and easy-to-understand guide on the most important contemporary neurophysiological techniques, their implementation, applications, and ways in which they can be combined and integrated with neuroscientific techniques. It is intended for second year graduate students with a basic neuroscience background to study cellular, synaptic, and circuit mechanisms of the brain functions in physiological and pathological conditions. Each topic area will provide a concise description of equipment, materials, methods, data management, and analysis. At the end of this course, the students will: 1) understand neurophysiological techniques regularly used by neuroscientists; 2) understand the implementation and applications of electrophysiology on brain functions at cellular, synapse, and system levels; 3) identify the major benefits and pitfalls of the neurophysiological methods.

N653 Topics in Cellular and Molecular Neurobiology (2 Credit Hours): This course will discuss major issues in Molecular and Cellular Neurobiology, emphasizing contemporary approaches.

N675 Research Rotations in Neuroscience (1-5 Credit Hours): Methods of research used by the faculty are demonstrated. Problem design and research methods emphasized. Course deals with individualized laboratory experience. Topics agreed upon by student and faculty sponsor.

N700 Research in Neuroscience (Variable Credit): Original dissertation research in Neuroscience under supervision of a Neuroscience faculty member and monitored by an advisory committee.

Pharmacology

Program and Degree Requirements
CIP Code: 26.0705

This program awards:
- PhD in Pharmacology
- MS in Pharmacology

Current research in the Department of Pharmacology focuses on cancer biology, structure-based drug design, cell signaling, cardiovascular disease, neurodegeneration, stem cells, and the discovery, development and testing of novel therapeutics. This work is supported by external funding, particularly from NIH.

To continue this excellent tradition in research and teaching and to keep pace with ongoing changes in pharmacology, our department is enhancing its research strengths and expanding into new research areas.

PhD Requirements:

Required Graduate Courses:
- GS616 Foundations of Molecular and Cellular Biology
- MPH602-002 Principles of Biostatistics
- GS604 Graduate Student Research Opportunities
- GS612 Biomedical Sciences Lab Rotations OR PHA653 Pharmacology Laboratory Rotations
- GS637 Responsible Conduct of Scientific Research
- PHA623 Grant Writing
- GS892 Introduction to the Presentation and Analysis of Scientific Literature: Journal Club

Elective Advanced Pharmacology Courses:
- PHA610 Principles of Pharmacology*
- PHA612 Cardiovascular Physiology and Pharmacology*
- PHA602 Cell Physiology of Excitable Cells*
- PHA615 Apoptosis and Cancer Pharmacology*
- PHA618 Current Topics of Pharmacology*
- PHA645 Pharmacology Seminar (one per year)
- PHA622 Principles and Practices of Drug Discovery and Development*
* All Pharmacology PhD students must take a minimum of 4 credits of Pharmacology courses indicated with an asterisk (PHA610 is required).

Total Didactic Graduate Courses – minimum 30 credits hours

Qualifying Examination – to be taken late summer of student’s second year

Dissertation Committee Meetings (min. of two per year)
Successful Dissertation Defense

**MS Degree Requirements:**

Required Graduate Courses:
GS616 Foundations of Molecular and Cellular Biology
MPH602-002 Principles of Biostatistics
GS637 Responsible conduct of Science Research (Research Ethics)
GS892 Introduction to the presentation and Analysis of Scientific Literature: Journal Club

PHA602 Cell Physiology of Excitable Cells*
PHA610 Principles of Pharmacology*

Advanced Pharmacology Courses:
PHA612 Cardiovascular Physiology and Pharmacology*
PHA615 Apoptosis and Cancer Pharmacology*
PHA617 Methods of Pharmacology Research*
PHA618 Current Topics of Pharmacology
PHA622 Principles and Practices of Drug Discovery and Development*
PHA623 Grant Writing
PHA645 Pharmacology Seminar (one per academic year)

* All M.S. students are required to take minimum of 4 advanced Pharmacology Course credits (including PHA610). Students can take other elective courses offered by the Department of Pharmacology or by other Departments to fulfill the didactic course requirement. Also, it is suggested that students take Methods of Pharmacology Research (PHA617) in the first year (no more than 4 credits).

Total Didactic Graduate Courses (min. of 20 credit hours).

Total Research Graduate Courses (min. of 10 credit hours)

Successful Thesis Defense

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**Course Descriptions**

**PHA602 Cell Physiology of Excitable Cells** (2 Credit Hours): Same as N602 above.

**PHA610 Principles of Pharmacology** (1 Credit Hour): This advanced course will cover and analyze the fundamental principles of Pharmacology at the cellular and molecular levels. Topics covered will be kinetics of drug distribution and elimination, as well as agonism, antagonism, cooperativity and desensitization. It will consist of a combination of graduate student-specific lectures and tutorials together with selected lectures from the Medical School Pharmacology course (S40PHA). The course may be taken in conjunction with other Pharmacology modules. A minimum of two students must register for this course to be offered.

**PHA612 Cardiovascular Physiology and Pharmacology** (1 Credit Hour): This advanced course will cover cardiac anatomy and physiology, basic mechanisms of cardiac arrhythmias, methods of diagnostics and treatment of cardiac diseases, and the mechanisms of action of antiarrhythmic drugs. The course will be run in a small discussion group format. The group will meet once a week to discuss a set of 4-5 topics formulated by the moderator. The students are expected to study the materials independently and be prepared to give a short presentation on any of the topics to the class as well as discuss it with other members of the group.

**PHA615 Apoptosis and Cancer Pharmacology** (2 Credit Hours): This advanced course will cover current concepts in cell death and cancer pharmacology, and will specifically address the molecular actions of anti-cancer agents with emphasis on death ligands/receptors, apoptotic machinery, tumor suppressor genes, oncogenes, molecular mechanisms of chemoprevention and anti-cancer drug resistance, novel anticancer drug targets and emerging anti-cancer therapies. It will consist of a combination of graduate student-specific lectures and tutorials.

**PHA617 Methods of Pharmacology Research** (Variable Credit): Methods of research used by faculty are demonstrated. Problem design and research methods are emphasized.

**PHA618 Current Topics in Pharmacology** (1 Credit Hour): The purpose of this tutorial course is to develop a student’s knowledge of Pharmacologic research as well as to provide an opportunity for focused study in areas of cell and molecular pharmacology not otherwise covered in the graduate curriculum. The course format may include selected readings, discussions with faculty, seminars, and lectures. Course content should be discussed with the faculty mentor prior to enrollment in the class, and a course outline with possible start and end dates should be prepared and approved by the Pharmacology Program Director.

**PHA622 Principles and Practices of Drug Discovery and Development** (1 Credit Hour): The course objective is to help students understand the overall process of drug discovery and development, structure-based drug design, combinatorial chemistry and high throughput screening in drug discovery, in vitro drug screening - identification and optimization of lead compound, mouse models for drug development, early safety and efficacy assessments, pharmacokinetics/toxicology (PK/TOX) studies in drug development, and nanotechnology in drug delivery. Students will be expected to read literatures and think critically about the objectives and experimental designs of the various stages of drug development.
PHA623  Grant Writing in Pharmacology (3 Credit Hours). The primary goal is to teach critical thinking, organizational skills and proposal writing using the current NIH R21 format. The course will be divided into 4 sections: (I) introductory sessions concerning the peer review process, application materials, the overall organization of the proposal, hypothesis development, and the setting of deadlines, (II) the development of Specific Aims and then the entire proposal in conjunction with thesis advisors (this will involve regular meetings and discussions between the student and advisor), (III) review and critiquing of the proposals by participating faculty and the class, (IV) revision of the proposal on the basis of critiques and completion of final version.

PHA645  Pharmacology Seminar (0 Credit Hours): Graduate students and faculty will meet every week during the academic year to participate in seminars. Seminars will be given by outside speakers and Departmental members, including Graduate Students who, after their first year, will be required to give one presentation per year. Grades will be assigned based on attendance and performance.

PHA653  Pharmacology Laboratory Rotations (Variable Credit): Students learn methods of research used by the Pharmacology Faculty. Problem design and research methods are emphasized. Written report required at end of rotation.

PHA700  Research in Pharmacology (Variable Credit): Original dissertation research in Pharmacology under the supervision of a Pharmacology Faculty member and monitored by an advisory committee.

**Physiology**

**Program and Degree Requirements**

CIP Code: 26.0706

This program awards:

- PhD in Physiology
- MS in Physiology

The major research in this department includes endocrinology, exercise science, neurophysiology, and pulmonary and sensory physiology.

Since a number of the Physiology faculty hold primary appointments in clinical departments, the Physiology program is an ideal vehicle for students looking to apply basic science research techniques to clinically relevant biomedical problems such as bone tumors, diabetes, osteoporosis, kidney disease and lung disease.

Experimental approaches range from studies on whole animals and isolated tissues to studies of cellular and molecular events.

Scientific inquiry may include the complex interactions of systems in the whole individual, the orchestration of processes integrating organ and cell function, and/or integration of molecular events within individual cells.

**PhD Requirements:**

**First Year:**
- GS604 Graduate Student Research Opportunities
- GS612 Biomedical Sciences Laboratory Rotations (1st Rotation)
- GS616 Foundations of Molecular and Cellular Biology
- GS612 Biomedical Sciences Laboratory Rotations (2nd Rotation)
- MPH602 Principles of Biostatistics
- GS612 Biomedical Sciences Laboratory Rotations (3rd Rotation)
- GS892 Introduction to the Presentation and Analysis of Scientific Literature: Journal Club

**Second Year:**
- GS637 Responsible Conduct of Scientific Research (Research Ethics)
- PHY627 Grant Writing Course in Neuroscience and Physiology

In addition, students must take additional advanced electives.

Each student in the Physiology Graduate Program is required to attend the complete seminar series and to present a seminar to the members of the Program each year.

Qualifying Examination to be scheduled at the end of the spring of the second year.

Successful Dissertation Defense

**MS Requirements:**

Master Student programs are tailored to meet individual student needs. MS students are required to take:

- GS637 Responsible Conduct of Scientific Research (Research Ethics)

**Course Descriptions**

**PHY602  Cell Physiology of Excitable Cells** (2 Credit Hours): Same as N602 above.

**PHY603  Biomaterials and Medical Devices** (2 Credit Hours): This course is designed to be an introduction to the field of biomaterials and medical devices. The basic material science of metals, ceramics, polymers, and biological materials used in medical applications will be presented. Major concepts will focus on structure-property relationships and the physical and mechanical properties of these important classes of materials.
PHY617 Methods of Physiology Research (Variable Credit): Methods of research used by the faculty are demonstrated. Problem design and research methods are emphasized. Course deals with individualized laboratory experience. Topics agreed upon by student and faculty sponsor.

PHY620 Advanced Topics in Receptors and Cell Signaling (1 Credit Hour): This advanced course will cover a topic in receptors and cell signaling; for example, G-protein-coupled receptors, integrins and cell adhesion, neuromuscular junction and ACh receptors, glutamate receptor signaling and LTP, CDKs with emphasis on the neural-specific CDK5, ras signaling and tyrosine kinase-linked receptors, scaffolding proteins, Topics will be covered by a combination of graduate student-specific lectures and tutorials, based on current research papers and associated reviews. Each topic will also include a take-home essay-type examination. Although it is not required, it is highly recommended that this course be taken in sequence with 619PHA-Autonomic Pharmacology.

PHY627 Grant Writing Course in Neuroscience & Physiology (3 Credit Hours): The primary goal of the course is to teach grant writing and critical thinking skills using the current NIH format for predoctoral fellowships. The course is divided into 3 sections: a brief series of information lectures about the NIH peer-review process and application materials. In section 2, students will develop their specific aims page through a series of one-on-one interactive meetings with the course coordinators. In section 3, students will work closely with the course coordinators as well as their mentors to develop the main body of the proposal based on their specific area of study. It is anticipated that the finalized application will be submitted to the NIH for funding consideration.

PHY620 Advanced Topics in Receptors and Cell Signaling (1 Credit Hour): This advanced course will cover a topic in receptors and cell signaling; for example, G-protein-coupled receptors, integrins and cell adhesion, neuromuscular junction and ACh receptors, glutamate receptor signaling and LTP, CDKs with emphasis on the neural-specific CDK5, ras signaling and tyrosine kinase-linked receptors, scaffolding proteins, Topics will be covered by a combination of graduate student-specific lectures and tutorials, based on current research papers and associated reviews. Each topic will also include a take-home essay-type examination. Although it is not required, it is highly recommended that this course be taken in sequence with 619PHA-Autonomic Pharmacology.

PHY659 Physiology Seminar (1 Credit Hour): Graduate students and faculty will meet once every other week during the academic year for the purpose of discussing current topics in neuroscience and physiology and departmental research programs. Outside speakers also participate. Each graduate student is required to present a critical review of a topic in biology during a scheduled meeting.

PHY700 Research in Physiology (Variable Credit): Independent research in preparation for dissertation requirement.

Additional Graduate Courses
The following courses may be required or electives, depending upon the program.

GS628 Systems Biology of Genetics, Genomics and Proteomics (4 Credit Hours): The goal of this course is to train graduate students in modern experimental and theoretical methods of performing systems level investigations that address fundamental and clinically-relevant questions in genetics, genomics and proteomics. The course is divided into 4 sections.

GS632 Biomolecular X-Ray Diffraction: Theoretical Basis and Experimental Procedures (4 Credit Hours): An introduction to the theory and practices of X-ray diffraction and crystallographic methods applicable to the elucidation of structure-function relationships of biological molecules and interactions thereof. The course is designed to provide a comprehensive understanding of the basic principles through in-depth theoretical discussion, extensive problem solving and hands-on experimental and computational steps through the biomolecular structure solution process. Prerequisite: undergraduate (senior level) biochemistry, chemistry, physics or physical chemistry or permission of the instructor.

GS638 Teaching for the Basic Scientist (2 Credit Hours). This course prepares the graduate student who desires to pursue an academic tract to teach by exploring the process for the design, delivery and assessment of any academic course for adult learners. The student will learn to write objectives and plan content as well as deliver content with an emphasis on active learning. The student will also learn appropriate assessment methods that fit the delivery and objectives of the course.

GS643 Introduction to Quality and Compliance for Biotechnology (3 Credit Hours): This course provides an overview of the skills and knowledge needed to perform and oversee quality and regulatory compliance functions within the biotechnology industry. This introduction in Quality and Compliance for Biotechnology reviews Good Pharmaceuticals Industry Practice (GXP) principles, procedural guidelines, FDA, and other regulations and ethical considerations.

GS647 Nanocourses in Biomedical Sciences (0.5 Credits): Nanocourses are short courses that meet for a total of ~7-8 hours and typically address a new or evolving area that is not covered by the standard graduate curriculum. The course
could be given in a week or two days or even over 7 weeks. Typical nanocourses could involve new methodologies (super-resolution microscopy, microfluidics, proteomics) or could focus on a specific biological entity (exocyst) or could be practical (presenting scientific data using Photoshop and Illustrator). Course could include lecture, discussion, paper presentations, problem solving or other modalities. A full list of courses can be found at [http://upstate.edu/grad/curriculum/nanocourses.php](http://upstate.edu/grad/curriculum/nanocourses.php).

**MD/PhD Courses:**
*(The courses below are unique to the MD/PhD program)*

**MDPH601 Research Design for Physician-Scientists** (3 Credit Hours): This course promotes the development of critical scientific writing important to the students’ future career as physician-scientists. The student will gain experience in grantsmanship by writing and presenting an original hypothesis-based research proposal. Students will learn the essential features of scientific writing, with the emphasis on developing skills necessary for crafting an effective grant proposal.

**MDPH602 MD/PhD Grand Rounds Course:** The MD/PhD Grand Rounds course is required for all MD/PhD students. Student participation and credits vary upon stage of training (see table of credits). MD/PhD Students are eligible to apply up to 9 credits from the Grand Rounds Course towards College of Medicine Elective credits. Credits earned for Grand Rounds course and Research Elective Credits cannot exceed 12 out of the required 25 College of Medicine Elective Credits.
The College of Health Professions was formed in 1971, however, programs in the Health Professions have been in existence on this campus since 1956. College of Health Professions’ students can choose from eight health care fields. All of the degree programs are transfer programs, either upper division, or graduate programs.

Each curriculum includes courses in professional subject areas, both didactic and clinical. The undergraduate programs include some arts and sciences coursework. The setting and structure of the College of Health Professions provide an opportunity for students in the various programs to learn to practice together as future members of the health care delivery team. The appropriate nationally recognized professional bodies accredit the professional programs, and graduates are eligible to apply to sit for licensure and/or certification immediately upon graduation.

**Arts and Sciences**

The presence of an Arts and Sciences division, housed within the College of Health Professions, underscores Upstate’s emphasis on excellence in education and dedication to producing informed and responsible health care professionals. Faculty members offer courses in the arts and sciences to undergraduate students in the College of Health Professions and College of Nursing. These offerings include a diverse spectrum of foundation courses in biological and physical sciences, mathematics, English, social and behavioral sciences, education, as well as courses specifically designed for health professionals. Designed to complement and broaden the student’s professional courses, Arts and Sciences classes serve to develop students’ knowledge base, scientific awareness, social sensitivity, critical thinking and problem-solving skills.

The Arts and Sciences courses are a required component in the curricula of the undergraduate programs in the College of Health Professions and the College of Nursing. Students must successfully complete their arts and sciences courses in order to earn a university degree.

**Course Descriptions**

**Biology**

**BIOC501 Biochemistry (4 Credit Hours):** This course is intended to provide a general understanding of the basic principles of biochemistry with an emphasis on their relationship to medicine. Topics will include: protein structure, carbohydrates, lipids, membranes, membrane transport, enzyme kinetics, metabolism and thermodynamics.

**BIOC502 Cell and Molecular Biology (3 Credit Hours):** This course is intended to provide a general understanding of molecular cell biology including DNA and chromosomes, transcription, protein synthesis, regulation of gene expression, cell structure, organelle function, cytoskeleton, endocytosis, receptors and second messengers, cell proliferation and differentiation, extracellular matrices, and cell adhesion and motility.

**BIOL310 Biostatistics (3 Credit Hours):** This is a basic course in statistical concepts designed to enable health science professionals to apply basic descriptive and inferential statistical techniques to problems in their field. The topics discussed include descriptive statistics, elementary probability, normal distribution, hypotheses testing, including: t tests, regression and correlation theories; analysis of variance (ANOVA); and chi-squared tests. The use of a computer statistical package will be emphasized.

**BIOL340 Physiology (3 Credit Hours):** This course covers more advanced principles of human physiology. Aspects of cellular physiology as well as the skeletal muscle, cardiovascular, respiratory, renal, gastrointestinal and endocrine systems are discussed.

**BIOL379 Cell and Molecular Biology (3 Credit Hours):** This course is designed to introduce the student to fundamental principles of cell biology and related concepts at the molecular level. Topics include molecular and structural organization of the eukaryotic cell, organelle structure and function, membrane structure and transport, cell communication, the cell cycle and programmed cell death, regulation of selected cell activities, cancer, and selected laboratory techniques in cell and molecular biology.

**BIOL420 Epidemiology (3 Credit Hours):** This course presents epidemiological principles and methods with emphasis on the health status and health needs of a population, on levels of prevention, and on promotion of health strategies.

**BIOL 414 Intro to Informatics (2 Credit Hours):** This course introduces students to the tools and knowledge needed to access and use molecular bioinformatic approaches in research. Unit 1 of the course examines genetic diversity of living organisms, provides essential background on the tools and terminology used in bioinformatics, and an introduction to the genetics of mitochondria and yeast. Unit 2 explores human genetics and tools used to identify genetic variants that cause disease and focuses on elements that regulate gene expression. Unit 3 provides an overview of high-throughput tools used to study gene expression, proteomics, and metabolomics in human and mouse models. This Unit culminates with an examination of metagenomic analyses, pharmacogenomics, and personalized medicine. Graduate students will complete a
Biol501 Human Genetics (3 Credit Hours): The course is intended to provide a general understanding of human genetics and its role in medicine including: the chromosomal basis of heredity, cytogenetics, Mendelian inheritance, population genetics, molecular diagnostics, genetic screening, human genome project, cancer genetics, mitochondrial genetics, single-gene disorders, chromosome abnormalities, and multifactorial disorders.

Biol441 Research Methods (3 Credit Hours): Provides an introduction and basic foundation to research process, theory, methods, practices, and statistical concepts with the goal of increasing understanding of how research knowledge is constructed. Topics include literature reviews, research article critiques, and the construction and presentation of a research proposal.

Biol451 Research Methods I (1 Credit Hour): Provides an introduction to concepts essential to research process, theory, construction and practices, in order to assist health professionals in becoming informed and critical consumers of their professional journals and the medical research literature. Topics include literature reviews and research article critiques.

Biol501 Human Genetics (3 Credit Hours): The course is intended to provide a general understanding of human genetics and its role in medicine including: the chromosomal basis of heredity, cytogenetics, Mendelian inheritance, population genetics, molecular diagnostics, genetic screening, human genome project, cancer genetics, mitochondrial genetics, single-gene disorders, chromosome abnormalities, and multifactorial disorders.

Chemistry


Chem352 Biochemistry Lab (1 Credit Hour): Concurrent with CHEM 351. Covers application of concepts learned in CHEM 351 Lecture.

Communication

Comm301 Media and Interpersonal Communication in Healthcare (3 Credit Hours): This course focuses on the various connections between the healthcare field, the media world, and interpersonal communication. The impact and influence of the media on peoples’ perceptions of various career fields is examined. Students will analyze the various perceptions of the healthcare field and the impact the media has on healthcare professionals through oral and written formats. Students will examine communication patterns and practice with various interpersonal communication skills that can be used throughout their careers to help provide superior patient care.
Education

EDUC352 Teaching Methods (3 Credit Hours): An interactive course focusing on the skills needed for effective teaching both inside and outside the traditional classroom. Students study teaching strategies, oral presentation principles, audiovisual techniques, and classroom management methods. Some education theory is discussed, but the course stresses the practical application of abstract ideas.

English

ENGL302 Prof Communications (0.5 Credit Hours): This course is the first course in a two-course sequence that prepares students entering the health professions in the essential areas of professional communication and will be linked to courses identified by the Department of the student’s major area of study. Specifically, course objectives will include optimizing student ability to produce coherent texts within common college-level written forms, demonstrate the ability to revise and improve such texts, research a topic, develop an argument and organize supporting details, and develop proficiency in oral discourse.

ENGL303 Prof Communications (0.5 Credit Hours): This course is the second course in a two-course sequence that prepares students entering the health professions in the essential areas of professional communication and will also be linked to courses identified by the Department of the student’s major area of study. Course objectives and assignments will vary by program of study, and will be dependent on what has previously been accomplished in the context of ENGL302 Foundations of Professional Communication I.

ENGL325 Prof & Tech Writing (3 Credit Hours): This course is founded on the premise that knowing how to use language in various oral and written forms builds skill in research, in reasoning, and in problem solving. Topics include how to create professional written documents such as: memoranda, reports, abstracts, reviews of professional texts, business letters, and résumés. Emphasis is placed on student ability to produce coherent texts, demonstrate the ability to revise and improve such texts, and write a formal proposal or research article.

ENGL 331 Examining Mental Illness in Shakespeare’s Tragedies (3 Credit Hours): In this course, students will read a few of Shakespeare’s tragedies through the lens of a mental health professional. Focusing on Sigmund Freud’s theories of psychoanalysis, students will examine character motivations for their actions, diagnose possible psychological disorders characters may suffer from, and recommend modern treatment options for one or more of the characters in each play.

Mathematics

MATH301 Laboratory Statistics (1.5 Credit Hours): This course covers the fundamentals of statistics as applied to medical and biological sciences, including statistical techniques adapted to laboratory quality control and design of experiments. Use of statistical programs for analysis of data is integrated within the course. Students will learn how to apply statistical tests of significance to laboratory data, evaluate and monitor the performance of analytical methods, use statistical techniques to validate reference range and interpret the clinical meaning of laboratory results through statistical methods.

Pathology

PATH360 Pathology (3 Credit Hours): This course covers basis pathologic mechanisms and specific diseases/disorders affecting the major organ systems of the human body. Commonly encountered diseases/disorders will be covered in detail. Pathophysiologic mechanisms and concepts are included, especially for most commonly encountered disease states. Topics such as genetics/heredity, immune system disease, and malignant processes are presented as well.

PATH610 Selected Topics in Pathology (3 Credit Hours): This advanced instructive pathology course employs reading, lecture discussion and demonstration to prepare students to understand the physiologic basis for selected disease conditions. Selected topics include adult acquired cardiovascular disease (HTN, DM, CAD, valves, RF, Marfans), congenital cardiac and pulmonary defects (CHD, fetal circulation, CDH, MAS, PPHN, HMD), sepsis, pneumonia, ARDS, and coagulopathy. Assessment focuses on the student's ability to evaluate the impact of pathologic conditions on the patient's health and recommend an appropriate extracorporeal application to improve the patient's condition.

Pharmacology

PHRM301 Pharmacology (2 Credit Hours): This course is designed to introduce students to medical pharmacology. Topics include pharmacokinetics, pharmacodynamics and fundamental principles of drugs that act on the autonomic and central nervous system. Emphasis is placed on the therapeutic effects, clinical applications, and toxicities of drugs used in the treatment of cardiovascular disorders.

PHRM601 Principles of Pharmacology (0.5 Credit Hour): This introductory instructive pharmacology course is linked to the lecture component of the Pharmacology course in the College of Medicine and employs video, reading, lecture, and discussion to develop the student's understanding of the fundamental principles in pharmacology. Emphasis is placed on the student's ability to describe fundamental principles in pharmacology and apply them in the context of patients supported with extracorporeal circulation technologies.
PHRM610 Selected Topics in Pharmacology (3 Credit Hours): This advanced instructive pathology course employs reading, lecture, discussion and demonstration to prepare students to understand the physiologic basis for selected disease conditions. Selected topics include adult acquired cardiovascular disease (HTN, DM, CAD, valves, RF, Marfans), congenital cardiac and pulmonary defects (CHD, fetal circulation, CDH, MAS, PPHN, HMD), sepsis, pneumonia, ARDS, and coagulopathy. Assessment focuses on the student's ability to evaluate the impact of pathologic conditions on the patient's health and recommend an appropriate extracorporeal application to improve the patient's condition.

SUNY General Education Requirements

On the basis of their upper-division status and relevant accreditation requirements, the Office of the SUNY Provost has partially waived the General Education requirements for undergraduate programs at Upstate Medical University. This waiver was granted based on the fact that all bachelor's degree programs are upper division and students enter with prerequisites of 60 credits, having met most of the knowledge and skill areas required by SUNY GenEd. The remaining GenEd requirements will be completed through their program of study at Upstate. The requirement for mathematics is met as a prerequisite requirement in the College of Health Professions, or by taking statistics in the College of Nursing. Other course requirements in the programs fulfill the Gen Ed distribution requirements as follows: Professional Communications, Professional & Technical Writing (basic communication), health care ethics and Research Methods (critical thinking) and demonstrating competence in the use of electronic health records and informatics systems (information management).

Center for Bioethics and Humanities

CBHX315 - Health Care Ethics (2 Credit Hours): This course applies ethical theories and principles to contemporary health care dilemmas. Students learn how ethical principles, such as autonomy, confidentiality, truth-telling, justice, beneficence, nonmaleficence, and informed consent, can be used to resolve particular ethical issues and specific cases, i.e. end of life, the allocation of health care, privacy, reproductive rights, testing and screening, biomedical research, and professional conduct. The course emphasizes critical thinking, case-based analysis, ethical decision-making and problem solving.

CBHX316 - Health Care Ethics, Literature, and Film (1 Credit Hour): The course uses literature and film to explore healthcare ethics issues and dilemmas. By analyzing and interpreting literature, fictional and documentary films, and other cultural and artistic work, students will develop analytical and interpretive skills and gain insights into patients' and communities' perspectives on health and healthcare. Students will apply ethical principles and theories to the social and cultural issues that emerge in the literature and film. Issues such as end of life; justice and health disparities; reproductive rights; genetics, testing and screening; biomedical research; empathy, and moral and professional conduct will be explored. The course develops critical thinking, narrative-based analysis, interpretative skills, professionalism, and empathy.

For a listing of electives visit: http://www.upstate.edu/bioethics/education/ed_chp.php

Cardiovascular Perfusion: Bachelor of Science Degree Program #
CIP Code: 51.0906

# This program stopped accepting students in 2017.

Perfusionists are operating room specialists who conduct cardiopulmonary bypass. That is, they pump and oxygenate the blood of patients whose hearts or lungs are stopped, usually during open heart surgery. Occasionally, perfusionists work outside the operating room, providing support for patients with circulatory failure. Working in conjunction with cardiac surgeons, perfusionists:
- adjust oxygen levels, change body temperatures, correct electrolyte imbalances and manipulate blood flow to meet each patient’s metabolic need;
- administer medications, blood products and fluids;
- monitor the coagulation status of a patient’s blood to prevent clotting;
- processing the patients’ own blood, and minimize the amount of blood lost during surgery, which minimizes the need for donated blood.

Program of Study for Cardiovascular Perfusion

Junior Year

Fall Semester  
Credit Hours  
BIOL 340 Advanced Physiology 3  
BIOL 441 Research Methods I - SUNY Gen Ed Course 3  
CVPR 305 Perfusion Laboratory I 2  
CVPR 310 Clinical Perfusion I 4  
CVPR 316 Cardiovascular Perfusion Techniques I 2  
CVPR 322 Physiologic Assessment 2  
PATH 360 Pathology 3  
TOTAL  19  
Spring Semester  
Credit Hours  
CBHX 315 Health Care Ethics** 2  
CCFM 402 Ethics and the Health Professions ** (3)  
CVPR 312 Cardiac Pathophysiology 2  
CVPR 325 Diagnostic Procedures 2  
CVPR 326 Pediatric Perfusion 2  
CVPR 328 Perfusion Critique 1  
CVPR 330 Blood, Coagulation and Hemostasis 2  
CVPR 345 Perfusion Laboratory II 2  
CVPR 350 Clinical Perfusion II 4  
ENGIL302 Foundations of Professional Communication 0.5  
TOTAL  17.5  
Summer Semester  
Credit Hours  
CVPR 360 Extracorporeal Life Support 3  
CVPR 371 Cardiovascular Perfusion Techniques II 2  
CVPR 385 Perfusion Laboratory III 2  
CVPR 390 Clinical Perfusion III 2  
CVPR 395 Summer Clinical Perfusion * (7)  
CVPR 374 Perfusion Research * (7)  
TOTAL  23
CVPR325 Diagnostic Procedures (2 Credit Hours): All the base mechanics are also covered. Parameters are discussed with the implications of each. Acid monitoring necessary in perfusion. Normal and abnormal are covered in depth. Prerequisites: CVP matriculation.

CVPR316 Cardiovascular Perfusion Techniques I (2 Credit Hours): This introductory course provides each of the various adult cardiac problems and their treatment. An overview of cardiac anatomy and physiology is included. Prerequisite: CVP matriculation.

CVPR312 Cardiac Pathophysiology (2 Credit Hours): This introductory course covers each of the various adult cardiac problems and their treatment. An overview of cardiac anatomy and physiology is included. Prerequisite: CVP matriculation.

CVPR316 Cardiovascular Perfusion Techniques I (2 Credit Hours): This introductory course provides the student with basic theory of perfusion. The principles of artificial oxygenation, pumps, filtration, cannulation and hypothermia are covered in depth. Prerequisites: CVP matriculation.

CVPR322 Physiologic Assessment (2 Credit Hours): This course provides in depth coverage of the various physiologic monitoring necessary in perfusion. Normal and abnormal parameters are discussed with the implications of each. Acid base mechanics are also covered.

CVPR325 Diagnostic Procedures (2 Credit Hours): All the various diagnostic procedures and their implications necessary prior to cardiac surgery are covered in lecture with selected observations. Clinical laboratory tests, hemostasis, blood component therapy, radiologic procedures, echocardiography and cardiac catheterization are included in this course.

CVPR326 Pediatric Perfusion (2 Credit Hours): Special procedures utilized for infants and children are presented in this course. Included are the embryologic basis for congenital cardiac malformations, as well as diagnostic, surgical and perfusion techniques employed unique to these individuals.

CVPR328 Perfusion Critique (1 Credit Hour): A discussion of clinical cases will enhance the integration of theory with clinical experiences.

CVPR330 Blood, Coagulation and Hemostasis (2 Credit Hours): This course provides detailed lectures regarding the composition of fluid blood including the formed elements and various components of plasma. The coagulation cascade is covered in depth with special attention to laboratory and point of care testing to monitor hemostasis. Coagulation abnormalities are described. Pharmacologic and blood component therapies for coagulopathies are covered. The use of blood products during cardiac surgery is presented and techniques of blood conservation are described.

CVPR345 Perfusion Laboratory II (2 Credit Hours): This laboratory course provides wet lab and clinical simulation of a variety of foundational extracorporeal principles and techniques. The laboratory modules are designed to complement the lecture material of second semester didactic courses while evaluating the students’ development of clinical skills which will be required in the clinical environment.

CVPR350 Clinical Perfusion II (4 Credit Hours): As the student gains more knowledge, additional skills will be practiced in the clinical setting. Students will begin assisting with the conduct of cardiopulmonary bypass with the instructor.

CVPR360 Extracorporeal Life Support (3 Credit Hours): This course includes didactic and laboratory components. The students will receive instruction in extracorporeal membrane oxygenation (ECMO) as well as ventricular assist devices (VAD) and their application in the clinical setting. Instruction will include fourteen (14) 2.5 hour lectures and twenty-three (23) hours of lab with hands on experience and three one hour examinations. The course is designed to lay a foundation for this area of specialized clinical practice. The course will cover the mechanical and physiological aspects of ECMO and VAD as well as their application and management.

CVPR371 Cardiovascular Perfusion Techniques II (2 Credit Hours): As the student becomes more involved with perfusion procedures, review and analysis of cases performed and standard risk management techniques enhances their cognitive understanding. Self-guided laboratory experiences allow students to utilize additional devices to expand their expertise. The laboratory also allows investigation of specific perfusion emergencies and how they are managed.

CVPR374 Perfusion Research (7 Credit Hours): This course provides experience in completion of a clinical investigation of a selected research topic. The student learns to use research methods under supervision. A paper and oral presentation are required.
CVPR385 Perfusion Laboratory III (2 Credit Hours): This laboratory course provides wet lab and clinical simulation of a variety of advanced extracorporeal principles and techniques. The modules provide hands on experience with a variety of simulated techniques which may be infrequently experienced in the clinical arena. Emphasis is placed on the students’ development of technical competency of skills which will be required in the clinical environment.

CVPR390 Clinical Perfusion III (2 Credit Hours): The students involvement in the clinical arena increases and clinical responsibilities at selected affiliates begin. Students will rotate being on-call for emergency clinical procedures.

CVPR395 Summer Clinical Perfusion (7 Credit Hours): Provides the opportunity for the student to continue their clinical education throughout the summer by participating in uncomplicated clinical procedures under the close supervision of the certified instructors at an affiliated institution in the Upstate New York area. Students may have on-call responsibilities and will be expected to relocate to the institution to which they are assigned for the duration of the course.

CVPR410 Clinical Perfusion IV (11 Credit Hours): Students are able to perform most perfusion with the instructor in attendance. Continued application of theory and development of psychomotor proficiency is the expected outcome. Students will rotate being on-call for emergency clinical procedures. Students will rotate through multiple clinical affiliates, within the city of Syracuse, throughout the semester.

CVPR414 Cardiovascular Perfusion Seminar online (4 Credit Hours): This seminar course is offered in an asynchronous distanced learning environment. Students will be assigned readings regarding a variety of special patient populations, applications of extracorporeal technology, conduct of cardiac surgery and legal implications of perfusion conduct. Students are required to demonstrate a significant level of participation in electronic discussions, perform independent research on related topics, and moderate discussion of assigned topics. Videoconferencing technology may be used for selected lectures.

CVPR450 Advanced Clinical Perfusion (15 Credit Hours): During this final semester students will further refine clinical skills necessary for a competent practitioner. Under the guidance of certified clinical instructors they will perform a wide variety of cardiopulmonary bypass procedures. Different affiliations will be utilized to broaden the experience of each student and enhance their competencies for entry into the profession. Some of these facilities are located outside of the Syracuse area. Students will rotate being on call for emergency clinical procedures.

Perfusionists are operating room specialists who conduct cardiopulmonary bypass. That is, they pump and oxygenate the blood of patients whose hearts or lungs are stopped, usually during open heart surgery. Occasionally, perfusionists work outside the operating room, providing support for patients with circulatory failure. Working in conjunction with cardiac surgeons, perfusionists:

- adjust oxygen levels, change body temperatures, correct electrolyte imbalances and manipulate blood flow to meet each patient’s metabolic need
- administer medications, blood products and fluids
- monitor the coagulation status of a patient’s blood to prevent clotting
- processing the patients’ own blood, and minimize the amount of blood lost during surgery, which minimizes the need for donated blood

**Program of Study for Clinical Perfusion**

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td><strong>Fall Semester</strong></td>
<td></td>
</tr>
<tr>
<td>CVPR 621 Cardiovascular Perfusion Techniques I</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 602 Physiological Assessment</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 610 Selected Topics in Medical Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 601 Research Methods</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 601 Professional Behaviors and Policy in Clinical Perfusion</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 625 Clinical Applications in Perfusion I</td>
<td>3</td>
</tr>
<tr>
<td>CVPR 631 Clinical Simulation I: Fundamental Skills</td>
<td>4</td>
</tr>
<tr>
<td>PHRM 601 Principles of Pharmacology</td>
<td>0.5</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>19.5</strong></td>
</tr>
<tr>
<td><strong>Spring Semester</strong></td>
<td></td>
</tr>
<tr>
<td>CVPR 622 Cardiovascular Perfusion Techniques II</td>
<td>2</td>
</tr>
<tr>
<td>PHRM 610 Selected Topics in Pharmacology</td>
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<td>PATH 610 Selected Topics in Pathology</td>
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<td>BIOL 603 Introduction to Immunology</td>
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<td>CVPR 640 Perfusion Research Proposal</td>
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<td>CVPR 626 Clinical Applications in Perfusion II</td>
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<td>CVPR 632 Clinical Simulation II: Case Management</td>
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<tr>
<td>CVPR 611 Extracorporeal Mechanical Circulatory Support</td>
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<tr>
<td>CVPR 603 Perfusion Safety</td>
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<tr>
<td>CVPR 627 Clinical Applications in Perfusion III</td>
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<tr>
<td>CVPR 641 Clinical Perfusion IA</td>
<td>2/7 variable</td>
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<tr>
<td>CVPR 633 Clinical Simulation III: ECMO</td>
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<tr>
<td>CVPR 634 Clinical Simulation IV: Crisis Management</td>
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<td>CVPR 690 Capstone Experience</td>
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<tr>
<td>CVPR 680 Research in Cardiovascular Perfusion</td>
<td>6/10 variable</td>
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<td><strong>Fall Semester</strong></td>
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<tr>
<td>CVPR 642 Clinical Perfusion IB</td>
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<td>CVPR 643 Clinical Perfusion IIA</td>
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<td>CVPR 690 Capstone Experience</td>
<td>2/1 variable</td>
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<td>CVPR 680 Research in Cardiovascular Perfusion</td>
<td>2/10 variable</td>
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**Clinical Perfusion: Masters of Science**

**Degree Program**

CIP Code: 51.0906
http://www.upstate.edu/chp/programs/cp/index.php
responsibilities and culture of clinical perfusion within a health care system. Examples of national policies and codes of conduct are presented and discussed within the context of the perfusionist's relationship and obligation to their patient, their profession and the industry that supports their field. Assessment focuses on the student's ability to thoughtfully evaluate and defend models of professional behavior as challenged through situational vignettes.

CVPR602 Physiologic Assessment (2 Credit Hours): This introductory course employs reading, lecture, discussion, and demonstration to develop the student's understanding of physiologic monitoring. Emphasis is placed on cardiovascular hemodynamics and pressure monitoring systems and acid-base homeostasis and blood gas assessment for the critical care patient. Assessment focuses on the student's ability to describe and troubleshoot the proper application of the monitoring systems, differentiate between normal and abnormal parameters, predict the implications of each and recommend measures that will remedy abnormal conditions.

CVPR603 Perfusion Safety (2 Credit Hours): This advanced introductory course employs reading, lecture, discussion, and case studies to prepare students to understand and apply the Cumulative Act Effect (Swiss Cheese Model) of accident causation. The taxonomy and classification of errors, failure domains, and active vs latent failures are presented and discussed within the context of the care of patients supported with extracorporeal circulation technologies. Assessment focuses on the student's ability to analyze case studies of accidents, summarize the error producing events and design a system which will reduce the risk of failure.

CVPR611 Extracorporeal Mechanical Circulatory Support (2 Credit Hours): This course employs readings, lecture, discussion and demonstration to prepare students to understand and apply extracorporeal technologies to the long-term support of critically ill patients. The design, application and management of Extracorporeal Membrane Oxygenation (ECMO) for long term pulmonary support cardiac support and Ventricular Assist Devices (VAD) is covered in detail. Assessment focuses on the students ability to distinguish the best extracorporeal application for a patients pathologic condition, design an appropriate extracorporeal system to support the patient, analyze and troubleshoot the performance of the extracorporeal support and patients.

CVPR621 Cardiovascular Perfusion Techniques I (2 Credit Hours): This introductory course employs reading, lecture, discussion, and demonstration to prepare students to apply fundamental principles and basic technologies to cardiopulmonary bypass applications. Emphasis is placed on the design, function, and application of extracorporeal materials and components (tubing, oxygenators, reservoirs, filters, pumps, cannulas, etc). Assessment focuses on the student's ability to perform preoperative calculations and component selection, explain component design characteristics, evaluate circuit configuration and explain their proper application.

CVPR622 Clinical Perfusion Techniques II (2 Credit Hours): This advanced course employs reading, lecture, discussion, and demonstration to prepare student to apply principles and techniques to the practice of extracorporeal circulation. Topics include hemostasis testing, autologous blood preservation (RAP/VAP, cell saver, circuit salvage), homologous blood component transfusion, hemocoagulation, circuit miniaturization hypothermia, selective perfusion techniques (SCP, HILP, HIPEC, ExVivo organs, donor harvest) and special patient populations. Assessment focuses on the student's ability to analyze and interpret physiologic and technical data and recommend techniques and technologies which will improve the patient's care.

CVPR625 Clinical Applications in Perfusion I (3 Credit Hours): This introductory course employs case based learning to help the students integrate and assimilate the concepts and principles presented in this semester's course work through group projects, presentations and discussion based on case studies of patients supported with extracorporeal circulation technologies. Assessment focuses on the student's ability to combine principles and concepts from across the curriculum into discussions of clinical scenarios and recommend appropriate actions which may include extracorporeal technologies and techniques.

CVPR626 Clinical Applications in Perfusion II (4 Credit Hours): This advanced course employs case based learning to help the students integrate and assimilate the concepts and principles presented in the second semester's course work through group projects, presentations, and discussions based on case studies of patients supported with extracorporeal circulation technologies. Assessment focuses on the student's ability to combine principles and concepts from across the curriculum into discussions of clinical scenarios and recommend appropriate actions which may include extracorporeal technologies and techniques.
and assimilate the concepts and principles presented in this semester’s instructive coursework through group projects, presentations, and discussion based on case studies of patients supported with extracorporeal circulation technologies. Assessment focuses on the student's ability to combine principles and concepts from across the curriculum into discussions of clinical scenarios and recommend appropriate actions which may include extracorporeal technologies and techniques.

CVPR631 Clinical Simulation I: Fundamental Skills (4 Credit Hours): This course employs medical simulation to develop the student's knowledge, critical thinking, clinical skills, and professional communication. Students begin to develop competence with the fundamental skills necessary for the safe conduct of cardiopulmonary bypass in the operating room through repetitive mentored practice. Assessment focuses on the student's ability to perform psychomotor tasks, analyze technical and physiologic data and recommend and conduct appropriate actions.

CVPR632 Clinical Simulation II: Case Management (4 Credit Hours): This advanced course employs medical simulation to develop the student's knowledge, critical thinking, clinical skills and professional communication. Students continue to develop competence through repetitive practice during full mission high fidelity simulation of CABG, Valve, DHCA and combined procedures. The assessment rubrics applied during the prerequisite course are expanded in this course to include ancillary perfusion skills, knowledge of the surgical procedures, and anticipation and conduct of perfusionist's interventions appropriately sequenced with the simulated surgical case.

CVPR633 Clinical Simulation III: ECMO (2 Credit Hours): This advanced course employs medical simulation to develop the student's knowledge, critical thinking, clinical skills and professional communication. Students begin to develop competence with the fundamental and crisis management skills of (ECMO) through repetitive practice during simulated standard and crisis situations. Assessment focuses on the student's ability to perform psychomotor tasks, analyze technical and physiologic data and recommend and conduct appropriate actions and demonstrate knowledge of the patient's anticipated clinical course, and anticipation and conduct of perfusionist's intervention.

CVPR634 Clinical Simulation IV: Crisis Management (2 Credit Hours): This advanced course employs medical simulation to develop the student's knowledge, critical thinking, clinical skills and professional communication. Students continue to develop competence with the fundamental skills of cardiopulmonary bypass through repetitive mentored practice during simulated crisis situations and under realistic error producing conditions. Assessment focuses on the student's ability to perform psychomotor tasks, analyze technical and physiologic data and recommend and demonstrate leadership while conducting appropriate crisis management and crew resource management actions.

CVPR640 Perfusion Research Proposal (1 Credit Hour): This advanced delegated applications course applies the concepts practiced in BIOL 601 Research Methods to the preparation of a proposal for either a research thesis or a capstone experience. Students will complete a proposal and any applications for institutional clearance (IRB, IACUC etc.) necessary for the completion of the proposed project. Research proposals must earn the support of a faculty mentor. Capstone proposals must conform to the departments menu of currently supported capstone experiences. Assessment is conducted by an advisory committee in accordance with the department’s academic policies regarding Research Thesis Projects and Capstone Experiences.

CVPR641 Clinical Perfusion IA (2/7 variable Credit Hours): This introductory clinical preceptorship course is conducted at recognized affiliate institutions. Students are imbedded within clinical perfusion departments and directly supervised, mentored and assessed by recognized and Certified Clinical Perfusion Instructors. Emphasis is placed on the growth and development of the student's knowledge, critical thinking, clinical skills and professional communication while practicing all aspects of the clinical perfusion scope of practice during patient care events. Students' performance is assessed according to the department's Clinical Competency Assessment Rubric. Students must consistently perform at or above the level of ADVANCED BEGINNER to successfully complete this course.

CVPR642 Clinical Perfusion I B (2/7 Variable Credit Hours): This introductory clinical preceptorship course is conducted at recognized affiliate institutions. Students are imbedded within clinical perfusion departments and directly supervised, mentored and assessed by recognized and Certified Clinical Perfusion Instructors. Emphasis is placed on the growth and development of the student's knowledge, critical thinking, clinical skills and professional communication while practicing all aspects of the clinical perfusion scope of practice during patient care events. Students must consistently perform at or above the level of ADVANCED BEGINNER to successfully complete this course.

CVPR643 Clinical Perfusion II A (7 Credit Hours): This intermediate clinical preceptorship course is conducted at recognized affiliate institutions. Students are embedded within clinical perfusion departments and directly supervised, mentored and assessed by recognized and certified clinical perfusion instructors. Emphasis is placed on the growth and development of the student's knowledge, critical thinking, clinical skills and professional communication while practicing all aspects of the clinical perfusion scope of practice during patient care events. Student performance is assessed according to the department's Clinical Competency Assessment Rubric. Students must consistently perform at or above the level of COMPETENT to successfully complete this course.

CVPR644 Clinical Perfusion II B (7 Credit Hours): This intermediate clinical preceptorship course is conducted at recognized affiliate institutions. Students are embedded within clinical perfusion departments and directly supervised, mentored and assessed by recognized and certified clinical perfusion instructors. Emphasis is placed on the growth and development of the student's knowledge, critical thinking,
clinical skills and professional communication while practicing all aspects of the clinical perfusion scope of practice during patient care events. Student performance is assessed according to the department's Clinical Competency Assessment Rubric. Students must consistently perform at or above the level of COMPETENT to successfully complete this course.

CVPR 645 Clinical Perfusion III (7 Credit Hours): This advanced clinical preceptorship course is conducted at recognized affiliate institutions. Students are embedded within clinical perfusion departments and directly supervised, mentored, and assessed by recognized and certified clinical perfusion instructors. Emphasis is placed on the growth and development of the student's knowledge, critical thinking, clinical skills, and professional communication while practicing all aspects of the clinical perfusion scope of practice during patient care events. Student’s performance is assessed according to the department's Clinical Competency Assessment Rubric. Students must consistently perform at or above the level of PROFICIENT to successfully complete this course.

CVPR680 Research in Cardiovascular Perfusion (2/10 variable Credit Hours): Original research in cardiovascular perfusion towards the fulfillment of a master's thesis performed with the mentorship of a faculty member. Assessment is conducted by an advisory committee in accordance with the department’s academic policy regarding Research Thesis Projects.

CVPR690 Capstone Experience (2/10 Variable Credit Hours): This advanced clinical preceptorship course is conducted at recognized affiliate institutions. Students are imbedded within clinical perfusion departments and directly supervised, mentored and assessed by recognized and Certified Clinical Perfusion Instructors. Emphasis is placed on the growth and development of the student’s knowledge, critical thinking, clinical skills and professional communication to develop excellence with a professional specialty as approved by the student’s advisor and the clinical site. This experience will be the subject of the students Capstone project which includes a written report and oral presentation in accordance with the departments academic policy regarding Capstone Experiences.

Medical Biotechnology: Bachelor of Science Degree Program
CIP Code: 26.1201
http://www.upstate.edu/chp/programs/mb/index.php

Graduates specializing in medical biotechnology work with a team to conduct medical research in academic or industrial settings. In university laboratories, these individuals assist scientists by performing experiments that are part of a medical research study. In industrial laboratories, biotechnologists help develop and manufacture pharmaceutical drugs or vaccines. Both types of laboratories are involved in research designed to treat or prevent human diseases such as heart disease, cancer, AIDS, genetic diseases, and many others.

Program of Study for Medical Biotechnology, BS
This program takes two years (five semesters). Prerequisite: 60 semester hours in selected subjects

Junior Year
Fall Semester
<table>
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<tr>
<td>CHEM 351 Biochemistry Lecture</td>
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<td>CHEM 352 Biochemistry Lab</td>
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<td>MATH 301 Laboratory Statistics</td>
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<td>PATH 360 Pathology</td>
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<tr>
<td>MEDT 350 Human Genetics</td>
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<td>MEDT 351 Hematology</td>
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<td>MEDT 308 Seminar in Biotechnology</td>
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Spring Semester
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<td>MEDT 303 Immunology</td>
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<td>MEDT 360 Chemistry</td>
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<tr>
<td>CBHX 315 Health Care Ethics</td>
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<td>BIOL 379 Cell &amp; Molecular Biology</td>
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<td>ENGL 325 Professional And Technical Writing</td>
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Summer Semester
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<tr>
<td>MEDT 422 Medical Microbiology</td>
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Senior Year
Fall Semester
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<th>Course Description</th>
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<tr>
<td>MEDT 439 Applied Techniques in Medical Biotech</td>
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<tr>
<td>BIOL 451 Research Methods I</td>
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<td>MEDT 454 Introduction to Molecular Methods</td>
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<td>BIOL 414 Intro to Informatics</td>
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<td>MEDT 434 Applied Statistics</td>
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<td>MEDT 460 Biotechnology Internship I</td>
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Spring Semester
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<tr>
<td>MEDT 419 Research Problem</td>
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<td>MEDT 455 Laboratory Operations</td>
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<td>MEDT444 Principles of Molecular Biology</td>
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<td>MEDT 522 Advanced Microbiology &amp; Immunology</td>
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<td>MEDT 461 Biotechnology Internship II</td>
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Total SUNY Upstate Medical University Program Credits: **72.5**

Course Descriptions

MEDT303 Immunology (3.5 Credit Hours): Immunology is the study of the immune system and its responses to infectious organisms and other foreign materials. This course presents basic concepts of humoral (i.e. antibody-mediated) and cell mediated immunity, and mechanisms of immunopathogenesis in specific diseases of the immune system. Basic principles of immunochemical and cellular assays are discussed in lecture and applied in exercises performed in the student laboratory.
MEDT308 Seminar in Biotechnology (1 Credit Hour): This course provides an introduction to the role of the baccalaureate level scientist in biotechnology. Course topics include career opportunities in biotechnology, certification routes, principles of quality control and quality assurance, manufacturing practices followed by industrial laboratories, regulatory issues, biosafety, laboratory notebook keeping, and ethical and professional standards.

MEDT350 Human Genetics (3 Credit Hours): Introduces students to the genetic concepts and technologies. Basic principles of genetics are presented and applied to the field of laboratory medicine and its role in patient diagnosis. Information related to Mendelian genetics, mitosis and meiosis, DNA, genes and chromosomes, transcription and translation, and mutations serve as a basic foundation for clinical applications of genetics including cytogenetics, molecular diagnostics, inherited human disorders, genetics of cancer, reproductive technologies, and prenatal diagnosis and genetic counseling.

MEDT351 Hematology (4 Credit Hours): Consists of lecture and laboratory sessions on the development of the formed elements of the blood (white blood cells, red blood cells, and platelets) and coagulation mechanisms of blood. Instruction also includes the varied hemato logic diseases.

MEDT360 Chemistry (5 Credit Hours): This course presents fundamental aspects of clinical laboratory chemistry. Clinical applications of analyte measurements and instrumentation methods used to measure analytes in body fluids are strongly emphasized. Integrated lectures and laboratory sessions focus on: carbohydrates, lipids, protein, enzymology, endocrinology, cancer markers, liver function, electrolytes, acid/base balance, renal function, therapeutic drug monitoring and toxicology. Operating principles of instrumentation are presented, and quantitative determination of clinical chemistry analytes in samples is made using clinical laboratory techniques and pertinent instrumentation.

MEDT419 Research Problem (3 Credit Hours): Provides experience in completion of a clinical investigation in a selected research topic. The student learns to use research methods under supervision and presents the results in a seminar and written report.

MEDT422 Medical Microbiology (6 Credit Hours): Course content includes integrated lectures and laboratory sessions designed to study bacteria, viruses, and other related organisms which can be pathogenic for humans. Topics include mechanisms of infection, disease states, clinical presentations, and the effect on the human host. Specimen collection and handling, isolation techniques, organism identification, clinical relevance, culture interpretation, susceptibility testing, as well as other methods used in the detection of agents responsible for infection are also covered.

MEDT434 Applied Statistics (1.5 Credit Hours): This course is designed to take the students beyond the basics of medical and research statistics. The course requires knowledge of fundamental statistics and working knowledge of a computer software program (for example Excel, Minitab, SPSS, Systat). The content of the course will focus on the solution of research questions presented by the instructor. Each student must determine what the problem requires and then select appropriate statistical tools necessary for the subsequent investigation of uncertainty and variability.

MEDT439 Applied Techniques in Medical Biotechnology (2 Credit Hours): This course focuses on clinical applications of advanced techniques in Medical Biotechnology. The course is taught through a combination of lectures, discussion, and small group or individual laboratory experiences, and assumes a prior knowledge of principles of human heredity and basic molecular techniques. Topics include clinical applications of molecular techniques in the diagnosis of genetic diseases, infectious diseases, and hematologic malignancies; cytogenetics and FISH; DNA sequencing; and flow cytometry. The student will also develop the fundamental skills required to procure blood samples for testing.

MEDT 441 Clinical Correlations I (1 Credit Hour): This course is comprised of a variety of case problems that allow students to draw upon foundational knowledge and concepts established in the pre-clinical courses and applied in the clinical rotation setting. The course teaches students to analyze and integrate content from across the different clinical laboratory disciplines as well as laboratory operations and management. Through reiterative application of problem-solving in a student-centered learning environment, this course will develop the students’ skills in critical reasoning and decision making, effective oral communication, efficient utilization of learning resources, and collaborative teamwork.

MEDT444/544 Principles of Molecular Biology (1 Credit Hours): The course is designed to prepare students for the American Society of Clinical Pathology national certification exam in Molecular Biology. Online learning modules cover concepts of molecular science, principles of molecular techniques, clinical applications of molecular testing, and laboratory operations necessary for genetic testing.

MEDT454 Introduction to Molecular Methods (2 Credit Hours): In this course, students will develop an understanding of the basic principles of laboratory methods in molecular biology. The course will emphasize hands-on experience with a variety of molecular techniques used in clinical laboratory science.

MEDT455 Lab Operations (2 Credit Hours): This course introduces the student to the operating principles and practices of the clinical laboratory. Course topics include the following as related to the pre-analytical, and post-analytical phases of laboratory testing: management principles and processes, regulatory resources, human resources, fiscal resources, quality management, and medical economics.

MEDT460 Biotechnology Internship I (8 Credit Hours): This course will provide students with the opportunity to participate in a supervised learning experience that integrates previous academic course work with practical application in a biotechnology laboratory setting. This experience will allow students to acquire knowledge and develop advanced technical skills that are employed in biotechnology.
MEDT461 Biotechnology Internship II (9 Credit Hours): This course will provide students with an opportunity to participate in a supervised learning experience that integrates previous academic course work with practical applications in a biotechnology laboratory setting. The experience can take place in the same laboratory setting experienced by the student in MEDT 460 Biotechnology Internship I, or in a different laboratory setting. This experience will allow students to acquire additional knowledge and continue to develop advanced technical skills in biotechnology.

MEDT522 Advanced Microbiology and Immunology (2 Credit Hours): This course will cover current topics in the fields of microbiology and immunology. Each topic will be introduced initially by a lecture presentation, which will be followed by a discussion of current publications on the topic. This course will allow students to develop an appreciation of recent advances in the biology of the immune system and how these relate to defense against infectious disease. The course will also allow students to gain an understanding of the pathological mechanisms of microorganisms and how those mechanisms evolve.

Medical Imaging Sciences: Bachelor of Science and Bachelor of Professional Studies Degree Programs

HEGIS Code: 1225
CIP Code: 51.0911
http://www.upstate.edu/chp/programs/mi/index.php

Medical Imaging Science professionals use a variety of computer/digital technologies to generate images for the diagnosis and treatment of disease. These professionals have a high level of patient contact for which strong interpersonal skills are critical. They work in hospitals, clinics, physicians’ offices, and imaging centers. Avenues for career development include leadership roles as supervisors, administrators, educators, and researchers. Our medical imaging sciences program educates students in the use of high-tech equipment and procedures to produce:

- Radiographic images (X-rays)
- Computed Tomography images (CTs)
- Magnetic Resonance Images (MRIs)
- Diagnostic Medical Sonography (Ultrasound) images

Program of Study for Bachelor of Science Programs

This upper-division program takes two years (five or six consecutive semesters) with students placed in one of three tracks in the second semester: Radiography (X-ray); Radiography CT, or Radiography MR. (Students who choose to pursue a BS in ultrasound apply directly to that program.) All graduates are eligible to take the national certification exams in their chosen modality.

Radiography Track, B.S.

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<tr>
<th>Junior Year</th>
<th>Credit Hours</th>
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<tr>
<td>Fall Semester</td>
<td>IMAG300 Imaging Practicum I</td>
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<tr>
<td>Fall Semester</td>
<td>BIOL451 Research Methods I - SUNY Gen Ed Course</td>
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<td>ENGL325 Professional And Technical Writing</td>
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<td>IMAG415 Imaging Clerkship I</td>
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<td>PATH360 Pathology</td>
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Spring Semester

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<tr>
<td>IMAG410 Quality Management In Medical Imaging</td>
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<td>IMAG411 Imaging Pathology</td>
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<td>IMAG412 Management Practices In MIS</td>
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<tr>
<td>IMAG416 Imaging Clerkship II</td>
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Computed Tomography (CT) Track, BS

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<tr>
<td>Fall Semester</td>
<td>IMAG300 Imaging Practicum I</td>
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<td>IMAG301 Positioning Principles I</td>
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<td>IMAG302 Positioning Laboratory I</td>
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<td></td>
<td>IMAG311 Fundamentals of Imaging and Physics</td>
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<td>IMAG312 Evaluating Radiographs I</td>
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<td>RDSC326 Radiologic Science Patient Care</td>
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<td>IMAG328 Introduction to Imaging Modalities</td>
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Spring Semester

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<tbody>
<tr>
<td>ENGL302 Foundations of Professional Communication</td>
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<tr>
<td>CBHX315 Health Care Ethics</td>
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<td>CBHX316 Health Care Ethics, Lit &amp; Film</td>
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<td>IMAG303 Imaging Practicum II</td>
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<td>IMAG304 Positioning Principles II</td>
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<td>IMAG305 Positioning Laboratory II</td>
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<td>IMAG313 Evaluating Radiographs II</td>
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<td>RDSC 324 Radiation Biology &amp; Protection</td>
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**Summer Semester**

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<tbody>
<tr>
<td>IMAG306 Imaging Practicum III</td>
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<td>IMAG308 Positioning Principles III</td>
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<td>IMAG314 Evaluating Radiographs III</td>
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<tr>
<td>IMAG329 Rad/Topo/Sec Anatomy</td>
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<tr>
<td>IMAG315 Positioning Laboratory III</td>
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**Senior Year**

**Fall Semester**

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**Spring Semester**

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**Summer Semester**

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### Magnetic Resonance (MR) Track, BS

**Junior Year**

**Fall Semester**

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<td>IMAG312 Evaluating Radiographs I</td>
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<td>RDSC326 Radiologic Science Patient Care</td>
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**Spring Semester**

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**Senior Year**

**Fall Semester**

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**Spring Semester**

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<tbody>
<tr>
<td>IMAG401 Imaging Practicum V</td>
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**Summer Semester**

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### Diagnostic Medical Sonography (Ultrasound), BS

**Junior Year**

**Fall Semester**

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<td>IMAG472 Abdominal Ultrasound</td>
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<td>RDSC326 Radiologic Science Patient Care</td>
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**Spring Semester**

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### Program of Study for Bachelor of Professional Studies (BPS)

This upper-division transfer program requires an associate's degree and certification in medical radiography. This is a program for radiography students who wish to pursue specialty education in CT, MRI or Sonography. The CT and MRI programs take three consecutive semesters to complete, while the diagnostic medical sonography program requires five consecutive semesters. All graduates are eligible to take national exams in their field. Students rotate through clinical education settings throughout New York State.

### Computed Tomography (CT) Track, BPS

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### Magnetic Resonance (MR) Track, BPS

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### Ultrasound Track, BPS

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Course Descriptions

IMAG300 Imaging Practicum I (1 Credit Hour): Clinical experiences structured into a sequence of progressively increasing levels of applied technical and patient care knowledge and skills. Student experiences will involve performing routine, trauma, portable, and surgical radiographic and fluoroscopic examinations. These experiences will develop student learning from observation through mastery levels.

IMAG301 Positioning Principles I (2 Credit Hours): Instruction of anatomy, radiographic positioning/procedures and equipment manipulation for radiographic examinations of the upper extremity, shoulder girdle, chest, abdomen, lower extremity, hip, pelvis, upper and lower gastrointestinal tract, gall bladder and biliary ducts, genitourinary system, lumbar spine. Through classroom participation and projection charting, students will identify anatomy and describe associated radiographic projections. They will establish interrelationships between the various projections and associated positions and will formulate radiographic principles for each radiographic exam.

IMAG302 Positioning Lab I (2.5 Credit Hours): Laboratory instruction of radiographic positioning, equipment manipulation, patient care and visual assessment of radiographs for radiographic examinations of the upper extremity, shoulder girdle, chest, abdomen, lower extremity, hip, pelvis, gall bladder and biliary tract, genitourinary tract, lumbosacral spine. Students will assume a technologist's role and perform all aspects of radiographic examinations on classmates under the guidance of the instructor.

IMAG303 Imaging Practicum II (4 Credit Hours): Clinical experiences structured into a sequence of progressively increasing levels of applied technical and patient care knowledge and skills. Student experiences will involve performing routine, trauma, portable, and surgical radiographic and fluoroscopic examinations. These experiences will develop student learning from observation through mastery levels.

IMAG304 Positioning Principles II (2 Credit Hours): Instruction of anatomy, radiographic positioning/procedures and equipment manipulation for radiographic examinations of the thoracic spine, cervical spine, sacrum, coccyx, bony thorax, cranium, facial bones, as well as myelography and arthrography procedures. Through classroom participation and projection charting, students will identify anatomy and describe associated radiographic projections. They will establish interrelationships between the various projections and associated positions and will formulate radiographic principles for each radiographic exam.

IMAG305 Positioning Lab II (2 Credit Hours): Laboratory instruction of radiographic positioning, equipment manipulation, utilization of image receptors, film processing and darkroom procedures, patient care, and visual assessment of radiographs for radiographic examinations of the thoracic spine, cervical spine, sacrum, coccyx, bony thorax, lymph system, cranium, facial bones, myelography, and arthrography. Students will assume a technologist's role and perform all aspects of radiographic examinations on classmates under the guidance of the instructor.

IMAG306 Imaging Practicum III (10 Credit Hours): Clinical experiences structured into a sequence of progressively increasing levels of applied technical and patient care knowledge and skills. Student experiences will involve performing routine, trauma, portable, and surgical radiographic and fluoroscopic examinations. These experiences will develop student learning from observation through mastery levels.

IMAG308 Positioning Principles III (1 Credit Hour): Instruction of positioning, procedures and equipment manipulation for pediatric, geriatric, trauma and "specialized" orthopedic radiographic examinations. Heart catheterization, operating room, emergency room, angiographic and mobile radiography procedures will also be studied. Students will summarize and demonstrate procedures.

IMAG311 Medical Imaging Fund (5 Credit Hours): This course will provide students with the knowledge of equipment routinely utilized to produce diagnostic images. Various recording media and techniques will be discussed. Other imaging equipment is described. Specific topics to be introduced are: fluoroscopy, tomography, mammography, mobile radiography, recording media, and cardiovascular imaging. Emphasis on quality will be incorporated into each area of discussion to include its rational, use, and continued process improvement. Students will be provided with handouts, PowerPoint presentations and internet resources.

IMAG312 Evaluating Radiographs I (1 Credit Hour): Formal sessions with students for the evaluation of radiographic films. Methods for proper evaluation of radiographs will be introduced and reinforced with practical application. Evaluation criteria will be presented for comprehensive understanding of the complex nature of imaging evaluation. The following criteria in the production of diagnostic quality images and in the remediation of suboptimal images will be covered in this course: density, contrast, spatial resolution, digital and film artifacts, fog, noise, acceptable exposure range, exposure indicator determination, gross exposure errors, image degradation, and image processing.

IMAG313 Evaluating Radiographs II (0.5 Credit Hours): This course will provide instruction on the evaluation of radiographic image quality with an emphasis on patient positioning, equipment orientation, and tube-part-IR alignment. Evaluation criteria will be presented for the following radiographic examinations: abdomen, chest, upper extremities, shoulder, and lower extremities.

IMAG314 Evaluating Radiographs III (0.5 Credit Hours):
This course will provide instruction on the evaluation of radiographic image quality with an emphasis on patient positioning, equipment orientation, and tube-part-IR alignment. Evaluation criteria will be presented for the following radiographic/fluoroscopic examinations: hip, pelvis, upper GI and lower GI tracts, GU system, cranium, vertebral column, and bony thorax.

IMAG315 Positioning Laboratory III (1 Credit Hour): Laboratory instruction of radiographic positioning, equipment manipulation, utilization of image receptors, film processing and darkroom procedures, patient care, and visual assessment of radiographs for radiographic examinations of the skull/temporal bones, sinuses, facial bones to include orbits, mandible and TMJ's, pediatric, geriatric, trauma and "specialized" orthopedic radiographic examinations as well as arthrography, myelography and mammography. Students will assume a technologist's role and simulate all aspects of radiographic examinations on classmates under the guidance of the instructor.

IMAG327 Topo/Sect/Imag Anatomy (3 Credit Hours): Topographic, sectional and radiographic anatomy will be studied through the use of cadavers, prosections, and body slices as well as radiographic, ultrasound, CT, and MRI images. Sonograms presented will demonstrate various anatomic structures in multiple orthogonal planes. The course will consist of presentations and laboratory demonstrations/study.

IMAG329 Topographic Sectional Imaging Anatomy (2 Credit Hours): Topographic, sectional and radiographic anatomy will be studied through the use of cadavers, prosections and body slices as well as radiographic, CT, MRI, and ultrasound 31 images. The course will consist of presentations and laboratory demonstrations/study.

IMAG400 Imaging Practicum IV (1 Credit Hour): Clinical experiences structured into a sequence of progressively increasing levels of applied technical and patient care knowledge and skills. Student experiences will involve performing routine, trauma, portable, and surgical radiographic and fluoroscopic examinations. These experiences will develop student learning from observation through mastery levels.

IMAG401 Imaging Practicum V (2 Credit Hours): Clinical experiences structured into a sequence of progressively increasing levels of applied technical and patient care knowledge and skills. Student experiences will involve performing routine, trauma, portable, and surgical radiographic and fluoroscopic examinations. These experiences will develop student learning from observation through mastery levels.

IMAG402 Imaging Practicum VI (4 Credit Hours): Clinical experiences structured into a sequence of progressively increasing levels of applied technical and patient care knowledge and skills. Student experiences will involve performing routine, trauma, portable, and surgical radiographic and fluoroscopic examinations. These experiences will develop student learning from observation through mastery levels.

IMAG403 Imaging Practicum VII (4 Credit Hours): Protocols for a quality management program incorporating all operations, functions of the medical imaging profession including operational, administrative aspects of quality management in radiation therapy, radiography, CT, MRI, mammography, & sonography. The comprehensive nature of a quality management program is presented, discussed within the context of professional standards of care. Relationships of accreditation, certification, licensure & service delivery standards are presented. Specific quality management practices for the various degree-tracked individuals are provided.

IMAG410 Quality Management Med Image (2 Credit Hours): This course examines pathologic conditions that are most commonly demonstrated by radiographic CT, MRI, and US imaging procedures. Upon completion of the course, students will be able to identify major pathologic conditions and will be able to recognize the more common pathologic conditions that will be encountered in clinical practice. The course consists of PowerPoint presentations of pathologies accompanied by discussion of the related pathophysiology.

IMAG411 Imaging Pathology (3 Credit Hours): This course introduces the student to management practices in medical imaging. Four primary areas focus on personnel, planning managing and finance. The student will be introduced to administrative structure, personnel management and communication styles and customer relations activities. The course will also introduce the practice of technology assessment, identifying future trends, and financing new technology. Finally, the student will become familiar with the specifics of managing an imaging department: total quality management, licensure, accrediting organizations and risk management.

IMAG415 Imaging Clerkship I (6 Credit Hours): In this sequence of clinical experiences, students will expand their knowledge and application of imaging principles in a progression of increasingly complex examinations in routine, portable, fluoroscopy, trauma, surgical, orthopedic and free standing imaging settings. Students will apply and synthesize imaging principles to formulate creative approaches to image attainment for "difficult" patient conditions. Through rotations in free standing imaging centers, students will gain working knowledge of patient scheduling and record/film management.

IMAG416 Imaging Clerkship II (7 Credit Hours): In this sequence of clinical experiences, students will expand their knowledge and application of imaging principles in a
progression of increasingly complex examinations in routine, portable, fluoroscopy, trauma, surgical, orthopedic and free standing imaging settings. Students will apply and synthesize imaging principles to formulate creative approaches to image attainment for “difficult” patient conditions. Through rotations in free standing imaging centers, students will gain working knowledge of patient scheduling and record/film management.

IMAG417 Adv. Imag. Proc. CT I (4 Credit Hours): This course will introduce the students to the basics of computer tomography image formation, equipment, and terminology. Concepts regarding parameters, scanning protocols and the clinical application of computed tomography will be addressed. Anatomy, positioning criteria, pathology, scanning criteria and any modifications from routine procedures related to the brain, abdomen, pelvis and thorax will be presented.

IMAG418 Adv. Imag. Proc. CT II (2 Credit Hours): This course will introduce the students to the advanced principals of computed tomography image formation, equipment and terminology. Concepts regarding imaging parameters, equipment differentiation, advanced scanning methods and the clinical application of these methods will be addressed. Anatomy, positioning criteria, pathology, scanning criteria and any modifications from routine procedures related to the central nervous system, musculoskeletal system, neck and interventional procedures will be presented.

IMAG431 Adv. Imag. Pract. I CT (5 Credit Hours): This sequence of clinical experiences, increasing in complexity, will allow the student the opportunity to practice skills necessary to obtain high quality CT images, to objectively alter protocols based on patient pathology or physical condition, and to identify image quality problems and make appropriate corrections. Clinical education is conducted at a clinical facility after or in conjunction with didactic instruction. This course presents a progression in clinical experiences from observation through performance and practice to the mastery level.

IMAG432 Adv. Imag. Practicum II CT BPS (7 Credit Hours): This sequence of clinical experiences, increasing in complexity, will allow the student the opportunity to practice skills necessary to obtain high quality CT images, to objectively alter protocols based on patient pathology or physical condition, and to identify image quality problems and make appropriate corrections Clinical education is conducted at a clinical facility after or in conjunction with didactic instruction. This course presents a progression in clinical experiences from observation through performance and practice to the mastery level.

IMAG434 Imag. Practicum III CT (8 Credit Hours): The sequence of clinical experiences, increasing in in complexity, will allow the student the opportunity to practice skills necessary to obtain high quality CT images, to objectively alter protocols based on patient pathology or physical condition, and to identify image quality problems and make appropriate corrections. Clinical education is conducted at a clinical facility after or in conjunction with didactic instruction. This course presents a progression in clinical experiences from observation through performance and practice to the mastery level.

IMAG435 Adv. Imag. Practicum II CT BS (5 Credit Hours): This sequence of clinical experiences, increasing in complexity, will allow the student the opportunity to practice skills necessary to obtain high quality CT images, to objectively alter protocols based on patient pathology or physical condition, and to identify image quality problems and make appropriate corrections. Clinical education is conducted at a clinical facility after or in conjunction with didactic instruction. This course presents a progression in clinical experiences from observation through performance and practice to the mastery level.

IMAG451 Adv. Imag. Practicum I MR (5 Credit Hours): This course presents the basic concepts of magnetic resonance imaging including MRI safety, magnetic characteristics of hydrogen atoms within the body, the Larmor equation, effects of external magnetic fields and radio frequency pulses on hydrogen atoms’ magnetic fields, pulse sequences, signal acquisition and related factors, variables affecting image formation, MR image tissue differentiation, slice localization using the Larmor equation, system hardware components, resonance and relaxation, image weighting and contrast parameters, spatial localization and data acquisition.

IMAG452 Adv. Imag. Practicum I MR (5 Credit Hours): This sequence of clinical experiences, increasing in complexity, will allow the student the opportunity to practice skills necessary to obtain high quality MR images, to objectively alter protocols based on patient pathology or physical condition, and to identify image quality problems and make appropriate corrections. Clinical education is conducted at a clinical facility after or in conjunction with didactic instruction. This sequence includes a progression in clinical experiences from observation through performance and practice to the mastery level.

IMAG454 Adv. Imag. Proced. II MR (2 Credit Hours): Topics presented will include pulse sequence parameters and image artifacts, advanced pulse sequences, and advanced applications in MR imaging.

IMAG455 Adv. Imag. Practicum II MR BPS (7 Credit Hours): This sequence of clinical experiences, increasing in complexity, will allow the student the opportunity to practice skills necessary to obtain high quality MR images, to objectively alter protocols based on patient pathology or physical condition, and to identify image quality problems and make appropriate corrections. Clinical education is conducted at a clinical facility after or in conjunction with didactic instruction. This sequence includes a progression in clinical experiences from observation through performance and practice to the mastery level.

IMAG457 Imag. Practicum III MR (8 Credit Hours): This sequence of clinical experiences, increasing in complexity, will allow the student the opportunity to practice skill necessary to obtain high quality MR images, to objectively alter protocols based on patient pathology or physical condition, and to identify image quality problems and make
appropriate corrections. Clinical education is conducted at a clinical facility after or in conjunction with didactic instruction. This sequence includes a progression in clinical experiences from observation through performance and practice to the mastery level.

IMAG 458 Adv. Imag. Prac. II MR BS (5 Credit Hours): This sequence of clinical experiences, increasing in complexity, will allow the student the opportunity to practice skills necessary to obtain high quality MR images, to objectively alter protocols based on patient pathology or physical condition, and to identify image quality problems and make appropriate corrections. Clinical education is conducted at a clinical facility after or in conjunction with didactic instruction. This sequence includes a progression in clinical experiences from observation through performance and practice to the mastery level.

IMAG 461 Ultrasound Physics and Inst. I (3 Credit Hours): This course will present the principles of ultrasound instruments, modes of operation, operator control options, frequency selection, echogenic properties, scanning motions and planes, as the principles apply to patient scheduling and patient preparation. A one-hour laboratory session included to simulate review of various obstetrical, gynecological, abdominal and regional anatomy (paraaanatomy) sonographic images and their presentation.

IMAG 462 Ultrasound Physics and Inst. II (3 Credit Hours): This course presents an expanded study of ultrasound principles and instrumentation concepts as they relate to interaction of sound and tissue, equipment instrumentation, bioeffects, quality assurance, transducer construction and artifact recognition for application in patient care.

IMAG 465 Ultrasound Senior Project (1 Credit Hour): In this course, the student will develop a hypothesis, abstract, outline, literature assessment, and conclusion for an independent senior research project to be completed in consultation with a member of the faculty. The subject matter will pertain to the diagnostic medical sonography profession. The student, with guidance from a faculty member, will utilize readings, texts, journal articles, practicum experience, or content from seminars and lectures to identify and explore selected subject matter. Students will present hypotheses, major findings, and conclusions.

IMAG 471 Contemporary Issues in Medical Imaging (4 Credit Hours): This course addresses issues in medical imaging and their impact upon the profession. A variety of health care topics will be discussed, disseminated and researched. Documentation of the various topics will include video presentations, case studies, journal entries, panel discussions on select topics, and literature review, presentations, and assessment.

IMAG 472 Abdominal Ultrasound (5 Credit Hours): This course will serve as both an introduction to ultrasound and instruction regarding various aspects of abdominal sonography. We will discuss ultrasound evaluation of the major organ systems and blood vessels found in the abdominal cavity. We will also cover various miscellaneous ultrasound exams that will not be covered in subsequent courses (pediatric hips, neuro sonography, pyloric stenosis). We will include discussion and demonstration of anatomy, physiology, pathology, and patient care issues related to sonography. There will also be a significant lab portion to the course. This will consist of hands on scanning practice and demonstrations.

IMAG 475 OB/GYN I (3 Credit Hours): This course presents the principles of ultrasound imaging as they relate to obstetric and gynecologic ultrasound procedures. Sonographic findings for various pathological and physiological conditions associated with the female and fetus are reviewed.

IMAG 476 OB/GYN II (2 Credit Hours): This course will present the disease processes and physiological alterations that occur within the female reproductive system and fetus. Sonographic image evaluation of various pathophysiologic conditions associated with the female and fetus are reviewed.

IMAG 477 Interventional Ultrasound (1 Credit Hour): This course will present various methods regarding interventional techniques for lesion localization, aspiration and biopsy. The management of aseptic and non-aseptic environments is discussed. Laboratory tests are examined and discussed regarding the relevance in patient management. This course will include medical terminology, pertinent clinical signs, symptoms, and laboratory tests, pertinent legal principles, infection control and universal precaution considerations and communication, examination ergonomics, and legal/ethical issues specific to obstetric and gynecologic ultrasound procedures are discussed, modeled and role-played. Students will prepare and present an OB/GYN case.

IMAG 478 Ultrasound-Superficial Structures (1 Credit Hour): This course will present gross and sectional anatomy of superficial (e.g. thyroid, breast, testes, joints, etc.) regions of anatomy. This course will include medical terminology, pertinent clinical signs, symptoms, and laboratory tests, pertinent legal principles, infection control and universal precaution procedures and pertinent patient care procedures. Vascular imaging is introduced with various applications for associated anatomy.

IMAG 480 Advanced Imaging Practicum I (7 Credit Hours): The student will be introduced to ultrasound scanning protocols with the opportunity to perform actual laboratory scanning of the abdomen with eventual practical application in the clinical environment. The student will learn how to produce diagnostic sonograms and differentiate normal and
abnormal images. Clinical performance is supervised and routinely evaluated. If clinical performance is unsatisfactory or compromises patient safety, immediate termination from the clinical portion of the program may result.

IMAG481 Advanced Imaging Practicum II (10 Credit Hours): Scanning of the abdomen, female reproductive tracts, fetus, and superficial anatomy will be accomplished. Introduction to vascular imaging associated with the aforementioned anatomy will occur. The continued production and interpretation of sonograms for each of these areas is expected. Students are expected to perform examinations in an independent and responsible manner consistent with level of experience and program objectives. Clinical performance is supervised and routinely evaluated. If clinical performance is unsatisfactory or compromises patient, immediate termination from the clinical portion of the program may result.

IMAG482 Advanced Imaging Practicum III (8 Credit Hours): Extensive scanning experiences in examinations involving abdominal, obstetric & gynecological procedures, superficial, interventional & vascular applications. Students are expected to perform examinations in an independent & responsible manner consistent with their level of experience & program objectives. Continued production & interpretation of sonograms for each of the aforementioned areas is expected. Clinical performance is supervised & routinely evaluated. Unsatisfactory clinical performance that compromises patient safety may result in dismissal from the clinical portion of the program.

IMAG483 Advanced Imaging Practicum IV (10 Credit Hours): Sequel to IMAG 482: Intense scanning experience for the student in abdominal, obstetric and gynecological, superficial, interventional and vascular applications. Students will perform examinations in an independent and responsible manner consistent with their level of experience and program objectives. Continued production and interpretation of sonograms for each of the previously mentioned is required. Clinical performance is consistently supervised and routinely evaluated. Unsatisfactory clinical performance that compromises patient safety may result in dismissal from the clinical portion of the program.

RDSC324 Radiation Biology & Protection (2 Credit Hours): The course content presents basic concepts & principles in radiation biology, radiation protection & safety philosophy & practice in the radiologic science environment. Radiation health & safety requirements of federal & state regulatory agencies, accreditation agencies & health care organizations are incorporated. Specific responsibilities of the radiologic science professional are discussed & examined. The interactions of radiation with cells, tissues & the body as a whole & resultant biophysical events will also be presented & applied to the clinical practice of medical imaging & radiation therapy.

RDSC326 Radiologic Science Patient Care (3 Credit Hours): This course orients the student to the clinical practice of Radiologic Science. Topics covered will include patient care clinical skills, medical terminology, and communication. The course will consist of lecture, demonstration, and laboratory experiences.

### Medical Technology (Clinical Laboratory Science): Bachelor of Science and Master of Science Degree Programs

CIP Code: 51.1005
http://www.upstate.edu/chp/programs/mt/index.php

Medical Technologists (also known as clinical/medical laboratory scientists) develop, perform and supervise laboratory testing that is used to diagnose and treat disease and to provide vital data for research studies. After graduation, many medical technologists work in hospital or physicians' office laboratories conducting a wide range of laboratory measurements—from simple blood tests to complex analyses for cancer, AIDS, viruses, bone marrow abnormalities, therapeutic drug monitoring, infectious disease and molecular diagnoses. Graduates are also prepared for careers that research and develop products used to prevent and treat human disease. They also work in academic settings with medical scientists performing experiments as part of research studies, or in industrial laboratories producing vaccines and other drugs. While a degree in medical technology provides immediate career opportunities after graduation, it is also a good foundation for advanced degrees in medicine or science, or for a career in other medically related fields such as physician's assistant.

#### Program of Study for Medical Technology, BS

Graduates of this program are eligible to apply for New York State licensure as a Clinical Laboratory Technologist. Graduates are eligible to sit for the national certifying examination given by the Board of Certification of the American Society for Clinical Pathology (ASCP).

Full-time Program of Study
This program takes two years (five semesters).

Prerequisite: 60 semester hours in selected subjects

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td><strong>Fall Semester</strong></td>
<td></td>
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<tr>
<td>CHEM351 Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM352 Biochemistry Lab</td>
<td>1</td>
</tr>
<tr>
<td>MATH301 Laboratory Statistics</td>
<td>1.5</td>
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<tr>
<td>MEDT309 Seminar In Medical Technology</td>
<td>1</td>
</tr>
<tr>
<td>MEDT350 Human Genetics</td>
<td>3</td>
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<tr>
<td>MEDT351 Hematology</td>
<td>4</td>
</tr>
<tr>
<td>PATH360 Pathology</td>
<td>3</td>
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<tr>
<td><strong>TOTAL</strong></td>
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<tr>
<td><strong>Spring Semester</strong></td>
<td>Credit Hours</td>
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<tr>
<td>MEDT303 Immunology</td>
<td>3.5</td>
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<tr>
<td>ENGL325 Professional And Technical Writing</td>
<td>3</td>
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<tr>
<td>CBHX315 Health Care Ethics</td>
<td>2</td>
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<tr>
<td>MEDT325 Urinalysis and Body Fluids</td>
<td>1</td>
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<tr>
<td>MEDT360 Chemistry</td>
<td>5</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>15.5</strong></td>
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**Program of Study for Medical Technology, MS**

This program provides advanced training to experienced medical technologists. Master's students specialize in one of three areas: chemistry, hematology, or microbiology. Master's students also select a minor area of concentration in either management/supervision, education or basic science.

The Master of Science in Medical Technology consists of a minimum of 24 Credit Hours of didactic course work and 6 Credit Hours of thesis work based upon the student's original research. The research project will be under the direction of a doctoral level member of the graduate faculty. It is expected that a full-time student should be able to complete the program in two years.

The course of study the student follows is tailored to the needs of the student as best as possible. The course requirements are printed below based on the area of specialization.

**Clinical Chemistry Program**

Courses Required:
- BIOC501 Biochemistry  4 Credit Hours
- MT624 Thesis Proposal  2 Credit Hours
- MT700 Thesis  4 Credit Hours
- MT636 Laboratory Instrumentation  2 Credit Hours
- MT626 Laboratory Statistics, Quality Control and Assurance  2 Credit Hours

Plus one graduate level Biochemistry course (2 Credits or more).

Sufficient elective work to meet the minimum degree requirements and to fulfill the Program of Study as defined by the student’s Academic Advisory Committee.

**Hematology Program**

Courses Required:
- BIOC501 Biochemistry  4
- MT624 Thesis Proposal  2
- MT700 Thesis  4
- MT644 Hematology Conference & Tutorial  1.5
- MT643 Hematology Journal Club  1
- MT645 Hematopathology  2
- MT646 Bone Marrow Practicum  2
- MT647 Special Hematology/Coagulation Practicum  1.5
- BIOC502 Cell and Molecular Biology  3

Sufficient elective work to meet the minimum degree requirements and to fulfill the Program of Study as defined by the student’s Academic Advisory Committee.

**Clinical Microbiology**

Courses Required:
- BIOC501 Biochemistry  4
- MT624 Thesis Proposal  2
- MT700 Thesis  4
- MT506 Microbiology Immunology  4
- MT640 Seminar in Clinical Microbiology  1

Suggested courses:
- MT615 Research Problem and Practicum in Microbiology  2
- MEDT522 Advanced Microbiology & Immunology  2
- MEDT502 Medical Microbiology  6
- MEDT503 Clinical Microbiology I  5
- MEDT504 Clinical Microbiology II  5
- BIOC502 Cell and Molecular Biology  3
- BIOL501 Human Genetics  3
- MEDT501 Biomedical Laboratory Operations  2

**Medical Scholars Program MS Degree**

**Fall Semester**

- BIOC501 Chemistry  4
- MEDT506 Microbiology/Immunology  4
- MEDT524 Mycology/Parasitology  2

**Spring Semester**

- BIOC502 Cell and Molecular Biology  3
- MEDT522 Advanced Micro/Immuno  2
- MEDT624 Thesis Proposal  2
- BIOL501 Human Genetics  3

**Extended Fall**

- MEDT503 Clinical Microbiology I (Rotation)  5
- MEDT502 Medical Microbiology  6
- MT700 Thesis  2

**Spring Semester**

- MT700 Thesis  3
- MEDT507 Infectious Disease  2
- MEDT501 Biomedical Laboratory Operations  2

**TOTAL CREDITS**  42

Total Upstate Medical University Program Credits  74.5
**Course Descriptions**

**Bachelor of Science**

**MEDT303 Immunology (3.5 Credit Hours):** Immunology is the study of the immune system and its responses to infectious organisms and other foreign materials. This course presents basic concepts of humoral (i.e. antibody-mediated) and cell mediated immunity, and mechanisms of immunopathogenesis in specific diseases of the immune system. Basic principles of immunochemical and cellular assays are discussed in lecture and applied in exercises performed in the student laboratory.

**MEDT309 Seminar in Medical Terminology (1 Credit Hour):** This course presents an introduction to the medical technologist/clinical laboratory scientist role in health care. Course topics include ethical issues in health care, certification, patient's rights, community health, resource allocation, as well as the role of the medical technologist/clinical laboratory scientist in research, education, and patient care.

**MEDT325 Urinalysis & Body Fluids (1 Credit Hour):** Teaches the core knowledge for competent performance of routine urinalysis, i.e., physical, chemical and microscopic examinations. Main learning experiences include lectures and integrated laboratory exercises.

**MEDT350 Human Genetics (3 Credit Hours):** Introduces students to the genetic concepts and technologies. Basic principles of genetics are presented and applied to the field of laboratory medicine and its role in patient diagnosis. Information related to Mendelian genetics, mitosis and meiosis, DNA, genes and chromosomes, transcription and translation, and mutations serve as a basic foundation for clinical applications of genetics including cytogenetics, molecular diagnostics, inherited human disorders, genetics of cancer, reproductive technologies, and prenatal diagnosis and genetic counseling.

**MEDT351 Hematology (4 Credit Hours):** This course consists of lecture and laboratory sessions on the development of the formed elements of the blood (white blood cells, red blood cells and platelets) and coagulation mechanisms of blood. Instruction also includes the varied hematologic diseases.

**MEDT360 Chemistry (5 Credit Hours):** This course presents fundamental aspects of clinical laboratory chemistry. Clinical applications of analyte measurements and instrumentation methods used to measure analytes in body fluids are strongly emphasized. Integrated lectures and laboratory sessions focus on: carbohydrates, lipids, protein, enzymology, endocrinology, cancer markers, liver function, electrolytes, acid/base balance, renal function, therapeutic drug monitoring and toxicology. Operating principles of instrumentation are presented, and quantitative determination of clinical chemistry analytes in samples is made using clinical laboratory techniques and pertinent instrumentation.

**MEDT401 Clinical Practice Preparation (1.5 Credit Hours):** This course provides an overview and introduction to the clinical internship/rotation including but not limited to internship expectations, professional behavior and communication, dress code, expectations and competency requirements. The course is also designed to prepare an individual to perform venipuncture and capillary puncture in order to obtain blood specimens for diagnostic procedures and understand the pre- and post-analytical variables that may affect laboratory test results. Laboratory safety, compliance and regulatory issues affecting the clinical laboratory will be reviewed.

**MEDT422 Medical Microbiology (6 Credit Hours):** Course content includes integrated lectures and laboratory sessions designed to study bacteria, viruses, and other related organisms which can be pathogenic for humans. Topics include mechanisms of infection, disease states, clinical presentations, and the effect on the human host. Specimen collection and handling, isolation techniques, organism identification, clinical relevance, culture interpretation, susceptibility testing, as well as other methods used in the detection of agents responsible for infection are also covered.

**MEDT424 Medical Mycology/Parasitology (2 Credit Hours):** The course offers lecture and laboratory experience in medical mycology and parasitology. The mycology portion of the course will cover topics to include the identifying characteristics and pathophysiology of the medically important fungi. The parasitology portion of the course will include topics on parasite life cycles, host-parasite interactions, pathophysiology of parasitic infections and criteria for the identification of protozoa, flagellates, nematodes, cestodes, and trematodes.

**MEDT425 Clinical Hematology (5 Credit Hours):** Students perform the procedures to detect the hematologic disorders dealing with the cellular and coagulation elements of the blood. Course topics include: routine blood cell counting and coagulation techniques, instrumentation and quality control, as well as specialized tests used to detect anemias and coagulation disorders. Special emphasis is placed on proficiency of differential counting of peripheral blood smears.

**MEDT427 Clinical Chemistry (4 Credit Hours):** This course involves performing qualitative and quantitative analyses of body fluids such as blood, urine, and spinal fluid. Quality control, which is an essential component of the clinical laboratory, is emphasized together with preventive maintenance and quality control for instrumentation. Students learn both operation and application of computers in a clinical laboratory.

**MEDT429 Clinical Microbiology (5 Credit Hours):** Course content includes clinical instruction and experience in the various areas of microbiology including specimen processing, culturing, culture evaluation and subsequent identification and susceptibility testing of isolates in routine bacteriology, in addition to the specialized diagnostic techniques of mycobacteriology, mycology, parasitology, and virology. Content includes correlation with causes of infectious diseases.
and current laboratory techniques and practices used to detect and identify causes of infectious diseases.

MEDT433 Clinical Immunology (2 Credit Hours): This course provides practical experience in the clinical immunology laboratory. Students perform routine and specialized procedures in serology and cellular immunology. Lectures and individualized instruction correlate principles of clinical immunology with the laboratory tests performed.

MEDT435 Clinical Urinalysis & Body Fluids (1.5 Credit Hours): A supervised learning experience, students perform basic and routine procedures on clinical specimens (urine and other body fluids i.e. CSF, synovial, semen, etc.) to gain proficiency and master technical skills. Emphasis is on clinical usefulness and limitation of each analysis. Clinical correlations and discussions are part of this course.

MEDT436 Clinical Blood Banking (3.5 Credit Hours): Students in this course will achieve proficiency in routine ABO and Rh typing and initial antibody identification techniques. Students will develop competence in the performance of reagent quality control, antibody detection, crossmatching, problem solving techniques for the resolution of common ABO typing discrepancies and final antibody identification, antibody elution, and cell phenotyping. The student will also be introduced to the practical aspects of component therapy and quality assurance in Blood Banking including blood utilization and review and blood bank information management systems.

MEDT441 Clinical Correlations I (1 Credit Hour): This course is comprised of a variety of case problems that allow students to draw upon foundational knowledge and concepts established in the pre-clinical courses and applied in the clinical rotation setting. The course teaches students to analyze and integrate content from across the different clinical laboratory disciplines as well as laboratory operations and management. Through reiterative application of problem-solving in a student-centered learning environment, this course will develop the students’ skills in critical reasoning and decision making, effective oral communication, efficient utilization of learning resources, and collaborative teamwork.

MEDT442 Clinical Correlations II (1 Credit Hour): This course is comprised of a variety of case problems that allow students to draw upon foundational knowledge and concepts established in the pre-clinical courses and applied in the clinical rotation setting. The course teaches students to analyze and integrate content from across the different clinical laboratory disciplines as well as laboratory operations and management. Through reiterative application of problem solving in a student-centered learning environment, this course will develop the students’ skills in critical reasoning and decision making, effective oral communication, efficient utilization of learning resources, and collaborative teamwork.

MEDT443 Immunohematology (3.5 Credit Hours): The study of the immunologic characteristics of blood cell antigens and antibodies including the concepts of in vitro hemagglutination test systems and physiologic mechanisms of hemolysis. Major content areas discussed include the blood group systems, blood component preparation, transfusion therapy, and the adverse effects of transfusion. Discussion of the principles and techniques of pretransfusion compatibility testing including antibody identification will be covered in lecture and practiced in laboratory exercises.

MEDT453 Capstone Project (1.5 Credit Hours): This course provides experience in the development of a publication-ready case study or research paper. The student learns to use research methods to complete a literature search and to apply this information in the development of a case study or to more fully investigate a selected research topic. The student will present the case study or research topic as a seminar.

MEDT454 Intro to Molecular Methods (2 Credit Hours): In this course, students will develop an understanding of the basic principles of laboratory methods in molecular biology. The course will emphasize hands-on experience with a variety of molecular techniques used in clinical laboratory science.

MEDT455 Laboratory Operations (2 Credit Hours): This course introduces the student to the operating principles and practices of the clinical laboratory. Course topics include the following as related to the pre-analytical, and post-analytical phases of laboratory testing: management principles and processes, regulatory resources, human resources, fiscal resources, quality management, and medical economics.

**Master of Science**

MEDT501 Biomedical Laboratory Operations (2 Credit Hours): This course is designed to develop an increased awareness of the business aspects of the clinical laboratory. Course topics include the following as related to the pre-analytical and post-analytical phases of laboratory testing: management principles and processes, regulatory resources, human resources, fiscal resources, quality management, marketing and medical economics.

MEDT502 Medical Microbiology (6 Credit Hours): Through integrated lectures and laboratory sessions medically important bacterial pathogens are discussed in terms of the clinical, therapeutic, and epidemiological aspects of diseases caused by them, molecular mechanisms of pathogenesis and their identification in the clinical laboratory. Specimen collection and handling, isolation techniques, organism identification, clinical relevance, culture interpretation, susceptibility testing, as well as other methods used in the detection of agents responsible for infection are also covered. Prerequisites: 1 year of Biology or permission of instructor

MEDT503 Clinical Microbiology I(5 Credit Hours): Course content includes clinical instruction and experience in the various areas of microbiology including specimen processing, culturing, culture evaluation and subsequent identification and susceptibility testing of isolates in routine bacteriology, in addition to the specialized diagnostic techniques of mycobacteriology, mycology, parasitology, and virology. Content includes correlation with causes of infectious diseases and current laboratory techniques and practices used to detect
and identify causes of infectious diseases. Prerequisite: MEDT422 or MEDT502.

MEDT504 Clinical Microbiology II (5 Credit Hours): The various areas of clinical microbiology including advanced techniques and laboratory testing used in the diagnosis and evaluation of infectious diseases, laboratory management, regulatory requirements, personnel evaluation, and interdepartmental collaboration. Evaluation of new testing methodologies and clinical rotational experiences in infectious disease and infection control will also be included. Lectures and individualized instruction are provided to correlate principles of clinical microbiology with the current laboratory techniques and practices used to detect and identify causes of infectious diseases.

MEDT506 Microbiology and Immunology (4 Credit Hours): This course is designed to give the student insight into the fundamentals of microbiology and immunology with emphasis on its relation to human biology and disease. The course covers the basic properties of microorganisms, microbial physiology and genetics, the principles of microbial pathogenicity, the mode of action of antibiotic and chemotherapeutic agents at the cellular level, the fundamentals of immunology, and the response of the host to infections. The microorganisms studied in this course include the bacteria, fungi, mycoplasmas, rickettsiae, chlamydiae, viruses and parasites.

MEDT522 Advanced Microbiology & Immunology (2 Credit Hours): This course will cover current topics in the fields of microbiology and immunology. Each topic will be introduced initially by a lecture presentation, which will be followed by a discussion of current publications on the topic. This course will allow students to develop an appreciation of recent advances in the biology of the immune system and how these relate to defense against infectious disease. The course will also allow students to gain an understanding of the pathological mechanisms of microorganisms and how those mechanisms evolve.

MEDT524 Medical Parasitology and Mycology (2 Credit Hours): The course offers lecture and laboratory experience in medical mycology and parasitology. The mycology portion of the course will cover topics to include the identifying characteristics and pathophysiology of the medically important fungi. The parasitology portion of the course will include topics on parasite life cycles, host-parasite interactions, pathophysiology of parasitic infections and criteria for the identification of protozoa, flagellates, nematodes, cestodes, and trematodes.

MT615 - Research Problem and Practicum in Microbiology (1-5 Credit Hours): Laboratory research experience with research time agreed upon by student and instructor that includes independent research experience covering topics in microbiology. Specific topics determined through consultation between student and appropriate faculty member. Tutorial conferences, discussions, and critiques scheduled as necessary. Grading determined by the instructor and could include, but not required, evaluation of skills learned, data obtained, and laboratory notebook record keeping and a final written report. Fall or Spring. Prerequisite: Permission of instructor.

MEDT624 Thesis Proposal (2 Credit Hours): This course will be the first course to be taken for Master’s Thesis credit in medical Technology. Under the supervision of a research advisor, the student will prepare an outline, abstract, and referenced review paper describing the problem to be studied, including the background and goals of the proposed study, significance of the problem, and methodological approach to be used in solving the problem. A grade of pass/satisfactory must be received in this course prior to enrollment in MT700 Thesis.

MT626 MT Laboratory Statistics, QC and QA (2 Credit Hours): Presents the most relevant statistical techniques which may be used to give proper interpretation of test results in the clinical laboratory. Topics include quality control (QC) activities, such as, calibration and linearity checks. Quality assurance activities (QA), such as the investigation of pre-analytical, analytical and post analytical variation will be studied. Consists of lectures and problem-solving sessions. Student evaluation consists of an exam, solving problems, and criterion based review. Meets weekly for the entire Fall semester.

MT628 Clinical Chemistry Conference (1 Credit Hour): Consisting primarily of special topics in Clinical Chemistry. This course is part of the Clinical Pathology Residents conference which is scheduled biweekly. This course is available from September through June each year. Arrange with Chemistry Teaching Supervisor for specific attendance schedule. Each student will make one presentation. Student evaluation consists of a criterion-based review.

MT631 Teaching Practicum in Instrumentation (1 Credit Hour): Allows students to gain experience in course development, lecture presentation, lab preparation and student evaluation. The student prepares a course outline, writes objectives, presents at least six lectures, assists in preparing student labs, writes examinations, and develops evaluation instruments for the students. Opportunity for self-observation and critique is provided through the use of videotape. The student works with the faculty and assists in MEDT 360 Chemistry. Student evaluation consists of written assignments, lecture presentations, and criterion base review.

MT635 Computer Utilization in the Laboratory (1 Credit Hour): Introduces the basic mode of computer operation and the use of computers in the clinical laboratory.

MT636 Laboratory Instrumentation (2 Credit Hours): Presents the electrical, optical, and mechanical principles of selected chemical instrumentation. Additional topics include electronics, computers, instrument maintenance, function checks, and troubleshooting techniques. Students attend selected lectures and labs presented in MEDT 360 Chemistry. Student evaluation consists of exams, homework problems, and written lab assignments.

MT640 Seminar in Clinical Microbiology (1 Credit Hour): Specialized topics in specific areas of Clinical Microbiology
will be presented and discussed in weekly Clinical Microbiology conferences. Students are expected to read papers relevant to the conference’s subject prior to the conference. Students are required to give at least two presentations to successfully complete this course. Course may be repeated once during the alternate semester so that a fall-spring semester sequence is completed.

MT641 Teaching Practicum in Microbiology (1-4 Credit Hours): The course is designed to provide students with experiences that will allow for the development of skills for effective undergraduate teaching. Course activities may include the development and presentation of lectures, leading discussion or review sessions, assisting in laboratory sessions, or development of materials for distance education. Additional activities may include development of written tests, one-on-one evaluations, or evaluation of oral presentations. Specific activities will be determined through consultation between student and faculty member. Grading determined by instructor.

MT642 Teaching Practicum in Immunology (3 Credit Hours): Provides practical experience in the preparation and delivery of undergraduate level instruction. The student is required to deliver five didactic presentations, and participate in the preparation and supervision of two laboratory sessions in the undergraduate Medical Technology course, MEDT 303 Immunology. For each didactic session, the student develops instructional objectives, a lesson plan, visual aids, and examination questions. Evaluation based on the preparation and delivery of each lesson plan, and a written paper covering one aspect of education theory.

MT643 Hematology Journal Club (1 Credit Hour): Graduate students, residents, fellows and faculty will meet every other week during the academic year for the purpose of discussing current articles published in the area of hematology. The graduate student is expected to read the assigned papers prior to the day of presentation and to take part in the discussion of the articles. The student is expected to present and discuss papers in rotation (at least 2 articles during the academic year.)

MT644 Hematology Conference and Tutorial (1.5 Credit Hours): Graduate students will take part in the Hematology Conference held every other Tuesday during the academic year in which topics on different aspects of hematology are presented and discussed. The students will be expected to read papers and study assigned case material relevant to the speaker’s subject prior to the conference. Following the conference, the graduate students will meet with the Hematology Faculty (Conference Coordinator) for discussion of questions and issues raised in the conference.

MT645 Hematopathology (2 Credit Hours): This course will provide a basic understanding of hematopathology and related areas. Subjects covered in the course include erythropoiesis and anemias, leukocytic disorders, leukemias, lymphoproliferative disorders myeloproliferative disorders, platelets and platelet disorders, blood coagulation, and transfusion therapy. The lectures, laboratories, and seminars are taken with the second year medical students as part of the medical school pathology course.

MT646 Hematology Bone Marrow Practicum (2 Credit Hours): Provides tutorial instruction in the morphology, cytochemistry, and immunohistochemistry of bone marrow, peripheral blood, and lymph nodes in the diagnosis and understanding of hematologic disease. Includes both microscopic and flow cytometric analysis. The student analyzes and writes reports and interpretations for a minimum of 15 bone marrow cases. Each case is reviewed and discussed in detail with the hematopathology fellow or attending pathology faculty member.

MT647 Special Hematology (1.5 Credit Hours): Provides instruction in the use of laboratory testing in the identification of various hemolytic anemias, and disorders of hemostasis and various coagulations factors. The student works with faculty and staff in the Special Hematology - Coagulation Laboratory studying the theory, performance and interpretation of laboratory testing.

MT648 Teaching Practicum in Hematology (3 Credit Hours): Provides practical experience in the preparation and delivery of undergraduate level instruction. The student is required to prepare a minimum of three lecture units including instructional objectives, lesson plans, visual aids, and examination questions. The student also assists in all laboratory sessions, and prepares and supervises in at least two laboratory sessions. Evaluation is based on the preparation and delivery of lectures and laboratory sessions, and a written paper covering one aspect of educational theory.

MT700 Thesis (1 to 10 Credit Hours): Independent research under the supervision of a faculty member.

**Physician Assistant: Master of Science in Physician Assistant Studies**

CIP Code: 51.0912  
http://www.upstate.edu/chp/programs/pa/index.php

Physician assistants are highly qualified licensed health care professionals who practice medicine with physician supervision. Physician assistants participate in a demanding academic and clinical curriculum that prepares them for the complexities of their career. Physician assistants are trained to elicit medical histories, perform physical exams, order and interpret diagnostic studies, perform clinical procedures and formulate patient treatment and management plans. Physician assistants practice in all areas of medicine and surgery. Opportunities exist in primary care offices (pediatrics, family practice and internal medicine), medical sub-specialty offices such as cardiology, gastroenterology and endocrinology, as well as general surgery and surgical sub-specialty practices such as cardiothoracic surgery and orthopedics. Physician assistants work in various settings including inpatient, outpatient, nursing homes, urgent care centers and emergency rooms.

**Summer Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPAS 605 Human Anatomy</td>
<td>9</td>
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<tr>
<td>DPAS 601 Professional Issues I</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>DPAS 603 Population Medicine</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>DPAS 608 EKG Interpretation</td>
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<tr>
<td><strong>TOTAL</strong></td>
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<td></td>
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</tbody>
</table>
issues dealing with patient consent, ethics, reimbursement

a continuation of Professional Issues I, introduces students to healthcare as they apply to physician assistants and the delivery of healthcare. Additionally, PA political and legal issues, patient referral and professional liability are introduced and discussed.

DPAS611 General Medicine I (5 Credit Hours): This course, the first course in a two course sequence, introduces students to the many aspects of the physician assistant profession. Students are introduced to the history and evolution of the profession, the scope of practice of physician assistants, requirements to maintain professional certification and licensure, professional issues facing PA’s today, the role of physician assistants in the delivery of health care, and patient confidentiality.

DPAS612 General Medicine II (5 Credit Hours): This course is a continuation of General Medicine I. Systems are reviewed in blocks, axis, hypertrophy, injury, and infarction.

DPAS613 General Medicine III (3 Credit Hours): This course is a continuation of General Medicine II with emphasis on medical problems in specialized settings and populations.

DPAS614 General Medicine IV (3 Credit Hours): This course, a continuation of General Medicine III, introduces students to issues dealing with patient consent, ethics, reimbursement issues, quality assurance, risk management, and legal issues of healthcare as they apply to physician assistants and the delivery of healthcare. Additionally, PA political and legal issues, patient referral and professional liability are introduced and discussed.

DPAS615 Behavioral Science (3 Credit Hours): This course introduces proper interviewing techniques and provides students with a background in obtaining a complete medical history as well as a problem oriented history. The skill and importance of proper chart documentation is also emphasized.

DPAS616 Research Design & EBM (2 Credit Hours): This course includes an in-depth review of the human body through lecture and cadaver dissections. Relationships between human development, structure and function are stressed. Applied clinical anatomy is also emphasized.

DPAS617 Clinical Pharmacology I (2 Credit Hours): This course covers the basic principles of pharmacology, as well as the interpretation of the 12 lead EKG including rate, rhythm, blocks, axis, hypertrophy, injury, and infarction.

DPAS618 Clinical Pharmacology II (3 Credit Hours): This course introduces proper interviewing techniques and provides students with a background in obtaining a complete medical history as well as a problem oriented history. The skill and importance of proper chart documentation is also emphasized.

DPAS619 Clinical Pharmacology III (3 Credit Hours): This course, the first of a two course sequence on physical exam, utilizes both lecture and lab. Using a head-to-toe approach, the lecture portion of this course reviews the proper procedure for performing a complete physical exam as well as the associated documentation for this clinical task. The laboratory component allows students the opportunity to develop, practice and perfect their technique.

DPAS620 Clinical Procedures (2 Credit Hours): This course, a continuation of Physical Diagnosis, teaches students the art of a detailed problem focused history and physical exam, along with some specialty exams that are commonly performed by physician assistants in clinical practice. The lecture portion of this course provides detailed descriptions of specific exams, while the laboratory portion allows students the opportunity to practice and perfect techniques.

DPAS621 Human Physiology I (3 Credit Hours): This course introduces proper interviewing techniques and provides students with a background in obtaining a complete medical history as well as a problem oriented history. The skill and importance of proper chart documentation is also emphasized.

DPAS622 Human Physiology II (3 Credit Hours): This course, the first of a two course sequence on physical exam, utilizes both lecture and lab. Using a head-to-toe approach, the lecture portion of this course reviews the proper procedure for performing a complete physical exam as well as the associated documentation for this clinical task. The laboratory component allows students the opportunity to develop, practice and perfect their technique.

DPAS623 Diagnostic Studies (2 Credit Hours): This course, a continuation of Physical Diagnosis, teaches students the art of a detailed problem focused history and physical exam, along with some specialty exams that are commonly performed by physician assistants in clinical practice. The lecture portion of this course provides detailed descriptions of specific exams, while the laboratory portion allows students the opportunity to practice and perfect techniques.

DPAS624 Clinical Decision Making (1 Credit Hour): Preventive health counseling is an important role of the physician assistant. In this course, disease prevention and patient education is emphasized. Students also learn about specialized needs of various populations in within communities. Additionally, the relevance of epidemiology and public health within community health is also discussed.

DPAS625 Clinical Procedures (2 Credit Hours): This course introduces proper interviewing techniques and provides students with a background in obtaining a complete medical history as well as a problem oriented history. The skill and importance of proper chart documentation is also emphasized.

DPAS626 Clinical Pharmacology II (3 Credit Hours): This course covers the basic principles of pharmacology, as well as the interpretation of the 12 lead EKG including rate, rhythm, blocks, axis, hypertrophy, injury, and infarction.

DPAS627 Clinical Pharmacology III (3 Credit Hours): This course, the first of a two course sequence on physical exam, utilizes both lecture and lab. Using a head-to-toe approach, the lecture portion of this course reviews the proper procedure for performing a complete physical exam as well as the associated documentation for this clinical task. The laboratory component allows students the opportunity to develop, practice and perfect their technique.
Specialized populations include OB/GYN and Geriatrics, and specialized settings include General Surgery and Emergency Room.

DPAS615 Behavioral Science (3 Credit Hours): This course emphasizes the use of behavioral sciences in understanding human functioning in health and disease. The course is organized into four units: overview, mood disorders, child and adolescent disorders, and somatoform disorders.

DPAS616 Research Design & Evidence Based Medicine (2 Credit Hours): This course introduces students to the basic language, logic, and designs used in clinical research. Principles of evidence based practice, as related to the clinical practice of medicine, are also introduced. This course prepares students for their capstone Master’s Project.

DPAS621 Human Physiology I (3 Credit Hours): This is the first course of a two course sequence. Using a systems approach, this course reviews the normal functioning of human tissues and organs as well as the pathophysiology of various diseases and illnesses. Organ systems are sequenced with drug classes in Pharmacology I and topics in General Medicine I.

DPAS622 Human Physiology II (3 Credit Hours): This course is a continuation of Physiology I. Systems are sequenced with topics in General Medicine II and drug classes in Pharmacology II.

DPAS623 Diagnostic Studies for Healthcare Providers (2 Credit Hours): This course is designed to teach the clinician the important question of when to order appropriate laboratory and medical imaging studies along with how to interpret these results. This course also reviews cost effectiveness for the purpose of improved patient monitoring and enhanced diagnostic accuracy. Age and gender appropriate indications for screening studies are also reviewed.

DPAS625 Clinical Pharmacology I (3 Credit Hours): This is the first course of sequence. This course covers general pharmacologic principles, drug receptor sites, physiologic reactions, half-life, therapeutic effects, metabolism, excretion and possible side effects of different classes of drugs on various organ systems. Practical clinical application is emphasized; drug classes are synchronized with organ systems in General Medicine I.

DPAS626 Clinical Pharmacology II (3 Credit Hours): This is the second course of sequence. This course covers general pharmacologic principles, drug receptor sites, physiologic reactions, half-life, therapeutic effects, metabolism, excretion and possible side effects of different classes of drugs on various organ systems. Practical clinical application is emphasized; drug classes are synchronized with organ systems in General Medicine II.

DPAS627 Clinical Pharmacology III (2 Credit Hours): This is the third course of sequence. This course covers general pharmacologic principles, drug receptor sites, physiologic reactions, half-life, therapeutic effects, metabolism, excretion and possible side effects of different classes of drugs on various organ systems. Practical clinical application is emphasized; drug classes are synchronized with organ systems in General Medicine I.

DPAS631 Pediatrics (2 Credit Hours): This course introduces students to the fundamentals of pediatric medicine, covering the neonate through the adolescent, including preventive care and the diagnosis and treatment of common pediatric disorders and illnesses.

DPAS632 Clinical Procedures (2 Credit Hours): This course involves both lecture and lab. The lecture portion reviews indications, contraindications, technique, and complications involving various clinical procedures. The laboratory portion allows students the opportunity to practice and perfect these techniques. Basic life support, advanced cardiac life support, and pediatric advanced life support are included in this course.

DPAS633 Clinical Decision Making (1 Credit Hour): This case-based course teaches systematic approach to the assessment and therapeutic management of clinical problems. Included in the case discussions are the history and physical exam findings, appropriate use of diagnostic studies, development of differential diagnosis, formulation of treatment plans, and description of disease prognosis.

DPAS634 Infection Control (1 Credit Hour): This online course fulfills the New York State requirements regarding infection control for licensed health care providers. Topics covered include infection control practices and interventions for compliance and safety, chain of infection, personal protective equipment (PPE), reprocessing methods, and prevention of blood borne pathogens and communicable diseases.

DPAS650 Clinical Rotation I (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS651 Clinical Rotation II (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS652 Clinical Rotation III (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting
under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS653 Clinical Rotation IV (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS654 Clinical Rotation V (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS655 Clinical Rotation VI (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS656 Clinical Rotation VII (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS657 Clinical Rotation VIII (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS658 Clinical Rotation IX (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS659 Clinical Rotation X (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS660 Clinical Rotation XI (4 Credit Hours): During this four-week clinical rotation, students are assigned to a clinically affiliated health care provider. In this setting, students are able to integrate the knowledge and skills learned during the didactic year and practice in a supervised setting under the direction of a licensed health care provider. Students will complete one of the following rotations: Family Medicine, Internal Medicine, Pediatrics, Women’s Health, Behavioral Medicine, General Surgery, Emergency Medicine, Long Term Care or an elective.

DPAS670 Master’s Clinical Research I (1 Credit Hour): This is the first of a three course sequence in which students begin to devise their final capstone Master's Project. Students work with the course instructor to define and refine a clinical question on a topic of their choice. Focused topics should be selected. Clinical questions can include, but are not limited to: diagnostic issues, management and treatment issues, and psychological and ethical issues. Students will also perform a literature search on their subject matter and compose an abstract describing their focus.

DPAS671 Master’s Clinical Research II (1 Credit Hour): This is the second of a three sequence course in which students continue to develop their final capstone Master's Project. During this supervised independent study course, students work with their project advisor to assure reasonable progress is occurring in development of an initial and final draft of their written report.

DPAS672 Master’s Clinical Research III (1 Credit Hour): This is the final of a three course series in which students create a poster on their selected research topic and present their poster to faculty and peers. During this supervised independent study course, students work with their project advisor to assure reasonable progress is occurring in development of their poster.
Physical Therapy: Doctor of Physical Therapy (DPT) and Post-Professional Doctor of Physical Therapy (T-DPT)

CIP Code: 51.2308

Physical therapists work directly with people to enhance movement and foster optimal health and functional ability. Patients include those who have sustained injury or illness, have developmental deficits, have age-related problems, or need preventive care.

Physical therapists examine and evaluate patients to determine functional abilities such as walking, work capacity and community activities. They may examine and evaluate strength, sensation, joint mobility, endurance, pain, reflexes and movement skill of patients. They plan therapy programs that may include exercises to improve functional abilities by increasing strength, endurance, balance, coordination and range of motion.

Program of Study for Doctor of Physical Therapy Program Code-Professional DPT: 27835

<table>
<thead>
<tr>
<th>First Year</th>
<th>Credits</th>
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<tr>
<td>PHYT 601</td>
<td>Gross Anatomy (6 Credit Hours)</td>
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<tr>
<td>PHYT 602</td>
<td>Professional Behaviors</td>
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<tr>
<td>PHYT 611</td>
<td>Bioscience I</td>
</tr>
<tr>
<td>PHYT 615</td>
<td>Introduction to Manual Therapy and Exercise</td>
</tr>
<tr>
<td>PHYT 621</td>
<td>Foundations of Patient/Client Management</td>
</tr>
<tr>
<td>PHYT 625</td>
<td>Kinesiology and Examination of the Upper Quarter</td>
</tr>
<tr>
<td>PHYT 642</td>
<td>Research Methods</td>
</tr>
<tr>
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| Spring | |
|--------||
| PHYT 604 | Differential Diagnosis in Physical Therapy | 3 |
| PHYT 605 | Neuroscience | 6 |
| PHYT 612 | Bioscience II | 2 |
| PHYT 616 | Physical Agents: Assessment and Intervention | 2 |
| PHYT 625 | Kinesiology and Examination of the Lower Quarter | 4 |
| **Total** | | 17 |

| Second Year | |
|-------------||
| PHYT 631   | Patient/Client Management: Adult Neurological Disorders | 3 |
| PHYT 632   | Patient/Client Management: The Spine | 2 |
| PHYT 644   | Physiology of Exercise | 2 |
| PHYT 636   | Patient/Client Management: Acquired Conditions | 3 |
| PHYT 645   | Ethics & Social Determinants of Health | 1 |
| PHYT 641   | Teaching & Learning in PT | 2 |
| PHYT 661   | Clinical Experience I | 8 |
| **Total**  | | 21 |

| Third Year | |
|------------||
| Elective | 1-3 |
| PHYT618 Therapeutic Exercise | 3 |
| PHYT634 Patient/Client Management: Developmental Disabilities | 3 |
| PHYT643 Critical Inquiry | 1 |
| PHYT646 Patient/Client Management: Orthopedics | 3 |
| PHYT647 Psychosocial Aspects of Patient Care | 2 |
| PHYT648 Imaging | 2 |
| PHYT650 Integumentary Management | 1 |
| **Total** | 16-18 |

Minimum number of program credits: 121 (includes 3 required credits of electives). Students may take up to a total of 9 credits of electives for a total of 127. Students are required to complete simulated patient examinations of the first two years.

**Course Descriptions**

PHYT601 Gross Anatomy (6 Credit Hours): This course utilizes a regional approach to the study of human anatomy. Cadaver dissection in the laboratory is supplemented by lectures, clinical correlation presentations, and audiovisual aids.

PHYT602 Professional Behaviors (3 Credit Hours): This course is framed around the core values, generic abilities and development of professional behaviors. The principles and foundational elements necessary for practicing in the professional realm of physical therapy and in the health care environment are reviewed. Issues relating to standards of practice, ethical and legal considerations, communication, time and resource management, stress management in relation to health and wellness, professionalism, and interpersonal and professional relationships are covered. Self-reflection and portfolio development are integral to the course.

PHYT604 Differential Diagnosis in Physical Therapy (3 Credit Hours): This course presents theories and concepts of clinical decision making and diagnosis in the context of determining if a patient presents with issues that are within the physical therapist’s scope of practice. All aspects of patient management are addressed with regard to a variety of systemic...
disorders, with emphasis on those that are most pertinent to physical therapy practice. Through lecture, discussion, and case-based exercises, students gain an understanding of the impact of common systemic disorders on patient management. Clinical experiences are integrated into this course.

PHYT605 Neuroscience (6 Credit Hours): This course presents an integrated approach to the general organization and function of the human nervous system and includes an in-depth presentation of human neurophysiology and neuroanatomy. Emphasis is placed on the sensory and motor systems. Medical aspects of neurologic conditions across the life span including differential signs and symptoms, typical clinical course, medical prognosis and management, are integrated with basic neuroscience knowledge.

PHYT611 Bioscience I (5 Credit Hours): Using a systems approach, this course emphasizes the integration of histology, physiology, pathology, and pharmacology as these disciplines apply to the human body across the life span. The relationship between structure and function of healthy body systems is investigated. The impact of common pathologies, and the pharmacological interventions used to treat those pathologies, on physical therapy practice are subsequently analyzed. Units of study include normal and abnormal structure and function of cells and tissue types, neural, endocrine, immune, muscle, circulatory, lymphatic and respiratory systems.

PHYT612 Bioscience II (2 Credit Hours): This course is a continuation of Bioscience I. Using a systems approach, this course emphasizes the integration of histology, physiology, pathology, and pharmacology as these disciplines apply to the human body across the life span. Units of study include the study of normal and abnormal structure and function of skeletal, integumentary, gastrointestinal, and genitourinary systems.

PHYT615 Introduction to Manual Therapy and Exercise (3 Credit Hours): This course introduces the principles of selected interventions, including soft tissue mobilization and manipulation, therapeutic massage, wellness and prevention, physical fitness, and therapeutic exercise.

PHYT616 Physical Agents: Assessment and Intervention (2 Credit Hours): This course reviews the biophysical principles, physiological implications, indications and contraindications underlying various physical agents, electrotherapeutic procedures and devices, and the operation of these modalities. Intervention rationale includes the use of evidence-based practice. Prerequisite: successful completion of all first year, fall semester courses.

PHYT618 Therapeutic Exercise/Activities (3 Credit Hours): This course develops clinical skills focused on advanced therapeutic exercise techniques, including aquatic therapy and therapeutic exercise and clinical management for selected patient populations.

PHYT621 Foundations of Patient/Client Management (3 Credit Hours): This course introduces the students to foundational practice models, concepts and mobility skills that serve as a basis for patient management. Professional documentation and use of outcome measures to promote clinical decision making will be introduced and practiced. Patient education and communication skills will be emphasized. Students will participate in an integrated clinical experience in an acute care or rehabilitation center to promote understanding and skill development.

PHYT625 Kinesiology and Examination of the Upper Quarter (4 Credit Hours): This course introduces and integrates basic kinesiological/biomechanical principles related to the normal function/movement of the cervicothoracic spine and upper quarter with the basic principles of patient/client management of common conditions of the cervical region and upper extremity.

PHYT626 Kinesiology and Examination of the Lower Quarter (4 Credit Hours): This course integrates kinesiological/biomechanical principles related to the normal function/movement of the lumbopelvic and lower quarter, including posture and gait, with the basic principles of patient/client management of spinal and lower extremity conditions across the life span.

PHYT631 Patient/Care Management – Adult Neurological Disorders (3 Credit Hours): This course begins the development of skills in examination, evaluation and interventions with individuals with neurological impairments. Content focuses on the adult patient with central nervous system dysfunction, such as head trauma, cerebral vascular accident and other neurological disorders. A problem solving approach is emphasized integrating student’s previous knowledge from Neuroscience regarding normal functioning of the nervous system, as well as disorders of the nervous system.

PHYT632 Patient/Care Management – The Spine (2 Credit Hours): This introductory course includes demographics, classification, examination, evaluation and physical therapy diagnosis of the spine.

PHYT634 Patient/Care Management – Developmental Disability (3 Credit Hours): This course examines the developmental concerns and issues encountered in pediatric clinical practice, in examination, evaluation, physical therapy intervention and coordination, communication and documentation for the pediatric patient are included. This course includes discussions of normal development, various pediatric diagnoses, family centered care, legislative issues, guiding pediatric physical therapy practice and coordination of physical therapy service with the pediatric team.

PHYT635 Patient/Care Management – Cardiovascular & Pulmonary Disorders (3 Credit Hours): This course focuses on the management of patient/clients with cardiopulmonary disorders with an emphasis on the normal structure and function of the cardiopulmonary system and the pathophysiology of the disorders of the respiratory system, heart, and circulatory system. Physical therapy examination
and treatment of the patient/client with cardiopulmonary dysfunction is the focus for clinical skill development.

PHYT636 Patient/Client Management: Acquired Conditions (3 Credit Hours): This course consists of three units: 1) theories and principles of examination, evaluation and interventions for individuals needing orthotics and prosthetics; 2) principles of examination, evaluation and interventions for individuals with spinal cord injury and; 3) application of clinical decision making processes related to examinations, evaluation and intervention across clinical settings.

PHYT637 Ethics and Social Determinants of Health (1 Credit Hour): This course acquaints students with the interrelationship of ethical principles and social determinants of health as they pertain to physical therapy and introduces a model for ethical decision making that integrates moral, legal and ethical principles in clinical practice. Cases that illustrate ethical issues and social determinants of health are discussed in ways that broaden perspectives on healthcare and develop appreciation for moral, legal, cultural, political and economic factors that influence patients and systems within the health care community.

PHYT638 Ethics in Action (1 Credit Hour): This service learning course provides students with the opportunity to work in community organizations that address health inequities. A minimum of 30 hours of service at select community sites will be coordinated through the Center for Civic Engagement. Monthly didactic learning sessions will be offered in coordination with PRVM423 Service Learning and Community Health, promoting interprofessional dialogue around shared service experiences.

PHYT641 Teaching and Learning in PT (2 Credit Hours): This course emphasizes the knowledge, skills and behaviors needed by the physical therapist to educate patients/clients, caregivers, families, professional colleagues, students and community members. Content includes application of teaching and learning theories, lesson plan development, didactic and clinical teaching techniques, methods of instruction and evaluation, and an introduction to the use of technology in education. A requirement of this course is to participate in a videotaped microteach session.

PHYT642 Foundations of Evidence Based Practice (2 Credit Hours): This course acquaints the student with the basic language, logic and methods of quantitative, qualitative and epidemiologic research as they apply to the health sciences. Principles of research are introduced through lecture, readings and assignments. Students are also introduced to the statistical tools most commonly employed in health research and to the use of a computer software package to store, manipulate and analyze data.

PHYT643 Critical Inquiry (1 Credit Hour): The purpose of this seminar is to apply the broad concepts of research methods, as presented in the Research Methods course, and the concepts learned in Foundations of Evidence-based Practice to specific clinical problems. The student will read, critically analyze, and summarize evidence found in physical therapy and related literature to complete a written review of literature.

PHYT644 Physiology of Exercise (2 Credit Hours): Acute and chronic physiological responses to exercise are examined. Principles of testing skeletal muscle function and cardiopulmonary fitness are emphasized. Guidelines for exercise prescription are addressed using case examples.

PHYT646 Patient Client Management – Orthopedics (3 Credit Hours): This course encompasses medical and physical therapy intervention for a variety of orthopedic disorders utilizing cases and current evidence to build upon previous orthopedic courses. Additional special topics are also introduced.

PHYT647 Psychosocial Aspects Patient Care (2 Credit Hours): This course provides an opportunity to analyze and synthesize the psychological and sociological aspects of patient/client care. The emphasis is on self-directed learning and self-knowledge.

PHYT648 Imaging (2 Credit Hours): This course provides an opportunity to review normal radiologic images as well as discuss findings for common patient / client conditions, injuries, or diagnoses. Indications for commonly used diagnostic imaging modalities are included.

PHYT650 Integumentary Management (1 Credit Hour): This course introduces the students to foundational concepts, examinations, tests, measures and interventions that serve as a framework for patient / client management of persons with integumentary concerns. The course will focus on wounds that are the result of venous insufficiency, arterial insufficiency, pressure, neuropathy, surgery, lymphedema and burns. Case studies, lab experiences, and patient observations are utilized to develop skills in these areas.

PHYT651 Applied Clinical Decision Making (2 Credit Hours): In this capstone course, students integrate the process of examination, evaluation, physical therapy diagnosis, prognosis, and interventions of selected conditions seen in physical therapy. A case-based, structured learning format employing the principles of evidence-based practice is used.

PHYT652 Management Principles (2 Credit Hours): This course allows the student to explore multiple aspects of the administrative process as it relates to the practice of physical therapy. An administrative project is an integral part of the course.

PHYT654 Geriatrics (3 Credit Hours): This course provides an in depth examination of aging as it relates to physical therapy. Concepts and principles of aging are examined in light of evidence-based practice, including the biological, psychological, social and cultural aspects of aging. Care is given to differentiate between normal biological age changes and those due to other factors such as physical inactivity, emotional responses, and disease processes.
PHYT661 Clinical Experience I (8 Credit Hours): This is the first of four full-time clinical education experiences that integrates academic course work with patient/client care. Experiences may take place at an in- or out-patient setting in a wide geographic distribution. Under the supervision of clinical faculty, students begin to develop knowledge, skills, and behavior in professional practice, patient management and practice management as defined in the Clinical Performance Instrument (CPI).

PHYT662 Clinical Experience II (8 Credit Hours): This is the second of four full time clinical education experiences that integrate academic course work with patient/client care. Experiences may take place at an in- or out-patient setting in a wide geographic distribution. Under the supervision of clinical faculty, students begin to develop knowledge, skills, and behaviors in professional practice, patient management and practice management. Course objectives reflect heightened expectations consistent with an intermediate clinical experience.

PHYT663 Clinical Experience III (10 Credit Hours): This is the third of four full time clinical education experiences that integrates academic course work with patient/client care. Experiences may take place at an in- or out-patient setting in a wide geographic distribution. Under the supervision of clinical faculty, students continue to develop knowledge, skills, and behaviors in professional practice, patient management, and practice management with movement towards, or achievement of, entry-level performance as defined by the Clinical Performance Instrument. (CPI)

PHYT664 Clinical Experience IV (10 Credit Hours): This is the fourth and final full time clinical education experience that integrates academic coursework with patient/client care. Experiences may take place at an in- or out-patient setting in a wide geographic distribution. At the conclusion of this experience, students consistently demonstrate entry-level performance in professional practice, patient management and practice management as defined by the Clinical Performance Instrument (CPI).

**Radiation Therapy: Bachelor of Science and Bachelor of Professional Studies**

**Degree Programs**

CIP Code: 51.0907

http://www.upstate.edu/chp/programs/rt/index.php

A radiation therapist works as a member of a team of oncology professionals who use carefully targeted doses of powerful radiation beams to destroy tumors without permanently damaging the surrounding normal tissues.

Graduates of both programs are eligible to apply to take the American Registry of Radiologic Technologists qualifying examination.

**Program of Study for Bachelor of Science Program**

For students who are transferring with at least 60 arts and science credits.

**Junior Year**

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Credit Hours</th>
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<tr>
<td>BIOL451 Research Methods I - SUNY Gen Ed</td>
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<tr>
<td>PATH360 Pathology</td>
<td>3</td>
</tr>
<tr>
<td>RADT300 Introduction To Radiation Therapy</td>
<td>2</td>
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<td>RDSC323 Radiologic Physics</td>
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**Senior Year**

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**Program of Study for Bachelor of Professional Studies**

For students who have an associate's degree and are registered or registry-eligible medical radiographers, with at least 63 credits.

**Junior Year**

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Course Descriptions

RADT300 Intro Radiation Therapy (2 Credit Hours): Content is designed to provide an introduction to the use of radiation therapy equipment, procedure and technique, patient positioning and immobilization for appropriate tumor localization and treatment delivery. The roles and responsibilities of the radiation therapist, the treatment prescription, the documentation of treatment parameters and delivery, emergency procedures and patient information needs will be presented. The use of electronic media will also be introduced. This course is taught through experience in the laboratory and clinical environment.

RADT317 Essentials of Oncology I (4 Credit Hours): The focus of this course will initially be on primary, secondary and tertiary disease prevention in general with particular reference to cancer prevention, detection, diagnosis, classification and treatment. The radiation therapist's responsibility in the management of neoplastic diseases of the skin, respiratory tract, and gastrointestinal tract will be covered including the epidemiology, etiology, detection, diagnosis, treatment and prognosis of tumors occurring at these sites. The course will consist of lecture and discussion.

RADT318 Essentials of Oncology II (2 Credit Hours): This course builds on material presented in RADT 317, continuing to focus on the radiation therapist's responsibility in the management of neoplastic diseases of the head and neck, CNS, musculoskeletal, lymphomas and leukemia, male and female genitourinary, pediatric and includes the epidemiology, etiology, detection, diagnosis, treatment and prognosis of tumors occurring at these sites. The course will consist of lecture and discussion.

RADT320 Intro to Clin Ed (3 Credit Hours): This course introduces the student to the clinical environment where clinical practice experiences are designed to provide care to the patient in the therapeutic setting for simulation, treatment planning and administration of a prescribed course of treatment. This will be performed initially in a laboratory setting, and then in clinical education settings, possibly outside of Syracuse, under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT321 Treatment Application I (4 Credit Hours): Sequential clinical practice experiences, increasing in complexity, during which the student provides patient treatments using various teletherapy units. This will be performed in various clinical education settings under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT327 Applied Rad Onc Anatomy (2 Credit Hours): Topographic, sectional, and radiographic anatomy as it applies to the practice of radiation therapy will be studied through the use of cadaver materials, and various diagnostic and therapeutic images. The course will consist of lecture, demonstration, and laboratory experiences.

RADT331 Clinical Simulation I (5 Credit Hours): Sequential clinical practice experiences, increasing in complexity, shall be designed to provide care to the patient in the therapeutic setting for simulation, treatment planning and preparation for administration of a prescribed course of treatment. This will be performed in various clinical education settings under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT335 Patient Care (1 Credit Hour): The focus of this course is for the student to experience the clinical application of the nursing and medical management of cancer patients. All
activities are performed under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT341 Radiation Oncology Imaging (1 Credit Hour): Content is designed to establish a knowledge base in factors that govern and influence the production and recording of radiographic images for patient simulation, treatment planning and treatment verification in radiation oncology. Radiation oncology imaging equipment and related devices will be emphasized. Laboratory sessions will facilitate student understanding and application of theory.

RADT342 Advanced Radiation Oncology Imaging (2 Credit Hours): Content is designed to establish a knowledge base in factors that govern and influence the production and recording of Computed Tomographic (CT) Magnetic Resonance (MR), Positron Emission Tomography (PET and Ultrasound imaging for patient simulation, treatment planning and treatment verification in radiation oncology.

RADT361 Medical Dosimetry I (3 Credit Hours): Content, through lecture, illustrated talk, and laboratory, is designed to provide a detailed theoretical and practical knowledge base for assessing, comparing, contrasting and recommending the type of radiation therapy equipment, procedure and technique, and considerations for tumor localization and treatment delivery. The treatment prescription, documentation of treatment parameters and delivery will also be presented and discussed. Furthermore, patient contouring, basic external beam, central axis treatment and brachytherapy calculations will be performed.

RADT365 Radiation Therapy Physics (3 Credit Hours): Content is designed, through lecture, discussion and illustrated talk, to provide a detailed analysis of the structure of matter, properties of radiation, nuclear transformations, x-ray production and interactions of ionizing radiation as it applies to treatment units used in external beam radiation therapy, measurement of ionizing radiation produced, absorbed dose measurement, and dose distribution.

RADT422 Treatment Application II (4 Credit Hours): Sequential clinical practice experiences, increasing in complexity, during which the student provides patient treatments using various teletherapy units. This will be performed in various clinical education settings under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT423 Treatment Application III (4 Credit Hours): Sequential clinical practice experiences, increasing in complexity, during which the student provides patient treatments using various teletherapy units. This will be performed in various clinical education settings under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT424 Clinical Simulation I (4 Credit Hours): Sequential clinical practice experiences, increasing in complexity, shall be designed to provide care to the patient in the therapeutic setting for simulation, treatment planning and preparation for administration of a prescribed course of treatment. This will be performed in various clinical education settings under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT432 Clinical Simulation II (4 Credit Hours): Sequential clinical practice experiences, increasing in complexity, shall be designed to provide care to the patient in the therapeutic setting for simulation, treatment planning and preparation for administration of a prescribed course of treatment. This will be performed in various clinical education settings under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT435 App Dosimetry I (4 Credit Hours): This clinical practice experience is designed to provide care to the patient in the therapeutic setting for simulation, treatment planning and administration of a prescribed course of treatment during which the student applies, integrates, synthesizes and evaluates the concepts and theories in radiation therapy patient treatment planning. This will be performed in various clinical education settings under the direct supervision of the clinical faculty. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT441 Clinical Internship I (5 Credit Hours): During first final spring clinical experience, the student, under the direct supervision of the clinical faculty, will perform all the functions of an entry level radiation therapist in all the clinical areas. These experiences permit the student to refine and develop clinical skills that reflect competencies for entry into practice. All experiences will be performed in clinical education settings, possibly outside of Syracuse. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT442 Clinical Internship II (5 Credit Hours): During this final clinical experience, the student, under the direct supervision of the clinical faculty, will perform all the functions of an entry level radiation therapist in all the clinical areas. These experiences permit the student to refine and develop clinical skills that reflect competencies for entry into practice. All experiences will be performed in clinical education settings outside of Syracuse. Progress is assessed through the evaluation of achievement of clinical competency and is graded via a pass/fail system.

RADT451 Radiation Therapy Seminar I (3 Credit Hours): The major focus of the senior seminar courses is on the practice of radiation therapy from a case-based point of view. Building on the basic knowledge of oncology and physics acquired in the junior year, the management of oncologic cases is explored in depth along with social, and psychological factors that impact on the treatment plan and delivery. Review of the current professional literature is also expected.

RADT452 Radiation Therapy Seminar II (3 Credit Hours): The major focus of the senior seminar courses is on the practice of radiation therapy from a case-based point of view. Building on the basic knowledge of oncology and physics acquired in the junior year, the management of oncologic cases is explored in depth along with social, and psychological factors that impact on the treatment plan and delivery. Review of the current professional literature is also expected.
Radiologic Science Patient Care (3 Credit Hours): This course orient the student to the clinical practice of Radiologic Science. Topics covered will include patient care clinical skills, medical terminology, and communication. The course will consist of lecture, demonstration, and laboratory experiences.

Respiratory Therapy: Bachelor of Science Degree

Respiratory Therapy is a health profession involving the treatment, transport, control, diagnostic evaluation and care of patients with deficiencies and abnormalities of the cardiopulmonary system. These patients may be found in: premature/newborn, pediatric and adult critical/intensive care units; emergency departments; outpatient departments; hospital wards; extended care facilities; the home; hyperbaric units; physicians’ offices; cardiopulmonary rehabilitation facilities; sleep disorder laboratories; nursing homes; and alternate care facilities.

Respiratory Therapists are life support specialists who care for patients who may have life threatening and/or disabling conditions and may require supportive mechanical ventilation and/or special Respiratory Therapy techniques. Respiratory therapists combine state-of-the-art technology (“high tech”) with close patient contact (“high touch”), and are experts in providing specialized and selective therapeutic respiratory care and special procedures. Therapists complete competency-based courses such as Neonatal Resuscitation Program (NRP), Pediatric Advanced Life Support (PALS) and Advanced Cardiovascular Life Support (ACLS). They are skilled in such areas as medical gas administration, humidification, aerosols, lung expansion techniques, bronchopulmonary hygiene, cardiopulmonary exercise, cardiopulmonary resuscitation, mechanical ventilation, airway management, pulmonary function studies, blood gas analysis and physiological monitoring.

Respiratory therapists are involved in the treatment of cardiac and cardiopulmonary disorders such as heart failure, asthma, pulmonary edema, emphysema and chronic bronchitis (COPD), cerebral thrombosis, drowning, hemorrhage, and shock. Therapists are educated and are competent in patient and peer teaching, community education, health promotion/disease prevention, various forms of research and other leadership/management roles in various organizations.

Program of Study: Bachelor of Science in Respiratory Care

The Program of Study for the Bachelor of Science Program is a full-time entry-level program in Respiratory Therapy. Graduates of this program receive a Bachelor of Science Degree in Respiratory Care and are eligible to sit for national credentialing examinations and to apply for licensure as respiratory therapists throughout the United States.

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<td>RESP321 Physical Principle of Respiratory Care</td>
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<td>RESP307 Disease Management I</td>
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<td>RESP313 Cardiopulmonary Physiology I</td>
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CIP Code: 51.0908
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<td>Cardiopulmonary Home Care and Rehabilitation</td>
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### Course Descriptions

**RESP304 Clinical Application I: Basic Respiratory Care (2 Credit Hours):** This introductory facilitated clinical course utilizes the lab setting in the first half of the course to prepare students in the application of fundamental principles and basic therapeutic procedures for the adult patient receiving respiratory care. Clinical practice of these basic skills is performed with patients in the second half of the course at various clinical sites under direct supervision of therapist preceptors.

**RESP305 Clinical Application II: Adult Critical Care (1 – 3 Credit Hours):** The student continues his/her patient interaction and delivery of basic respiratory care procedures and is introduced to the critical/intensive care setting including patients on mechanical ventilation. Via problem- and case-based learning sessions & simulation, the student continues to develop critical thinking, problem solving, clinical reasoning and inquiry skills. Prerequisite – RESP304.

**RESP306 Clinical Application III: Adult Critical Care 2 (4 Credit Hours):** This course gives the student an opportunity to function more independently in all areas of adult respiratory care with an emphasis on critical care and patients on mechanical ventilation. Through more clinical hours and simulation learning exercises, the student has the opportunity to sharpen critical thinking, problem solving, and reasoning skills. Prerequisite – RESP305.

**RESP307 Disease Management I (4 Credit Hours):** This introductory course introduces the student to case-based learning whereby etiology, clinical manifestations, diagnosis and disease management are applied to common cardiopulmonary diseases. Emphasis is placed on the clinical management of patients including formation and evaluation of evidence-based disease management plans and protocols.

**RESP308 Disease Management II (2 Credit Hours):** This intermediate course continues with case-based learning whereby etiology, clinical manifestations, diagnosis and disease management are applied to common cardiopulmonary diseases. Additional disease/disorders are presented as in RESP307. Emphasis is placed on the clinical management of patients including formation and evaluation of evidence-based disease management plans and protocols.

**RESP313 Cardiopulmonary Physiology I (3 Credit Hours):** This introductory introduces the student to basic concepts leading to the understanding of the physiology of the cardiopulmonary system. Emphasis is placed on the student’s understanding of normal cardiopulmonary physiology as a background for the understanding of cardiopulmonary pathophysiology.

**RESP321 Physical Principles of Respiratory Care (2 Credit Hours):** Mathematical/ Algebraic, chemistry and biological concepts are reviewed to help ensure understanding of key respiratory care physical principles such as laws and properties & characteristics of gases, liquid flow under various physiologic conditions, humidity, change of state of matter,
solutions, dilution calculations, mechanisms of medication action, and principles governing heat, magnetism and electricity.

RESP323 Cardiopulmonary Physiology II (3 Credit Hours): This intermediate course builds Cardiopulmonary Physiology I with emphasis on pulmonary function testing, acid-base balance and regulation, cardiac and cardiovascular systems, cardiac electrophysiology, electrocardiograms and cardiac arrhythmias, introduction to advanced cardiovascular life support, cardiopulmonary response to exercise in health & disease, and effects of aging on the cardiopulmonary system.

RESP324 Ventilatory Support (3 Credit Hours): This intermediate course introduces the student to the concepts and clinical application of mechanical ventilation in all settings in which a respiratory therapist utilizes both the equipment and techniques of this form of life support. This is a complementary course to RESP 340 Clinical Lab II.

RESP329 Neonatal Respiratory Care (2 Credit Hours): This course emphasizes the relationships between normal neonatal development and cardiopulmonary physiology with specific pathophysiologies resulting from a variety of neonatal conditions. Emphasis is placed on content, concepts and evidence-based practice guidelines related to the assessment, diagnosis and management of situations and conditions that may challenge and potentially compromise the cardiopulmonary system of the neonate.

RESP330 Concepts in Hemodynamics (2 Credit Hours): This advanced course emphasizes hemodynamic measurements in normal patients and those with various hemodynamic abnormalities. Emphasis is placed on terminology, diseases, pharmacology, fluid balance, and calculations related to various patient cases, classic case examples and simulation, interpretation of clinical case study/patient data, assessing the patient’s condition, initiating clinical interventions, formulation of a care plan and evaluating the impact of implemented strategies.

RESP338 Clinical Lab I (2 Credit Hours): This first clinical laboratory course introduces students to the application of fundamental principles and basic therapeutic procedures for the adult patient receiving respiratory care. Emphasis is placed on the application of equipment and procedures used in basic respiratory care therapeutics.

RESP339 Global Teaching for the Respiratory Therapist (2 Credit Hours): This course includes the basics of professional classroom, laboratory, clinical, community, patient and family teaching. Topics include: teaching and learning; teaching and learning styles; educational taxonomies; writing concise, complete and measurable objectives; methods of evaluation and testing; cultural, religious, and ethnic sensitivities and strategies; communication; Joint Commission, DNV and agency education requirements; using effective teaching strategies.

RESP340 Clinical Lab II (2 Credit Hours): This intermediate clinical laboratory course emphasizes the application of mechanical ventilators and related technologies & procedures in the laboratory and simulation settings. This is a complementary course to RESP 324 Prerequisite – RESP 338.

RESP344 Clinical Lab III (2 Credit Hours): This advanced clinical laboratory course is both a review of knowledge & skills in RESP338 and 340, and clinical courses RESP301 and 310. This course prepares students for application of more advanced principles, concepts and skills in critical/respiratory care particularly mechanical ventilation and The AHA Advanced Cardiovascular Life Support (ACLS). Prerequisites: RESP338 and 340.

RESP407 Clinical Application IV Neonatal/Pediatric Critical Care (4 Credit Hours): This advanced faculty-facilitated clinical application course is conducted in neonatal and pediatric critical care units and in floor care settings (pediatric only). Students work directly with patients receiving mechanical ventilation and other advanced life support under direct program faculty supervision and mentorship.

RESP408 Clinical Application V: Adult Critical Care 3 (4 Credit Hours): This advanced clinical preceptor-facilitated clinical application course is conducted in adult critical care units in Central, Western, Northern and Southeastern New York State clinical affiliate hospitals. Experiences serve as a further intensification of the summer adult critical care clinical applications course with students working under the direct supervision, guidance, and mentoring of clinical preceptors.

RESP409: Clinical Application VI: Comprehensive Respiratory Care (4 Credit Hours): This advanced, clinical applications course is conducted in selected areas of patient care in selected clinical affiliate hospitals, labs, clinics or physician offices. Students are embedded in specified clinical rotation locations and directly supervised, mentored and assessed by selected clinical preceptors. Prerequisites: RESP 407 and 408

RESP422 Sleep Disorders, Polysomnography and Sleep Technology I (1 Credit Hour): This classroom course includes topics in sleep disorders, diagnostics and treatment. This course builds upon the student’s basic knowledge of sleep disorders covered in previous courses. This course includes the basics/physiology/pathophysiology of sleep and sleep disorders, theory and operation of sleep study instrumentation, application of respiratory care and other modalities, patient testing, sleep staging and scoring, arrhythmia recognition and other physiologic events, data acquisition, and patient management.

RESP423 Sleep Disorders, Polysomnography and Sleep Technology II (1 Credit Hour): This advanced clinical preceptor-facilitated clinical application course is conducted in clinical affiliate sleep laboratories under the direct supervision of clinical preceptors. This course builds upon the knowledge gained in RESP 422 Sleep Disorders, Polysomnography, and Sleep Technology I. Students work one-on-one with clinical
RESP431 Cardiopulmonary Home Care and Rehabilitation (2 Credit Hours): This seminar course places on concepts, principles and special knowledge, equipment, techniques and patients seen in the home and ancillary environments specific to the role of the respiratory therapist. The second half of the course is dedicated to concepts, principles, special knowledge, equipment, techniques and patients seen in cardiopulmonary rehabilitation programs.

RESP436 Leadership and Management (1-3 Credit Hours): This course emphasizes understanding the basics of organizational and human behavior, motivation, evaluation and processes in leadership, supervision and management. Emphasis is also placed on true leadership and how effective leaders innovate, motivate, lead through crisis and change, manage conflict, and recognize & lead in toxic and effective organizations.

RESP438 Acid Base Physiology (3 Credit Hours): This advanced course builds on previous knowledge of acid base physiology with emphasis placed on reviewing the basics of organic and biochemistry plus general acid-base principles in normal individuals and those with primary and secondary disturbances in acid-base balance with discussion of metabolic, respiratory and mixed disturbances, renal physiology and pathophysiology, various acid-base disturbances, monitoring, instrumentation and quality assurance.

RESP439 Evidence-Based Practice Respiratory Care (2 Credit Hours): This capstone builds upon and intensifies the concepts of evidence-based medicine and evidence-based practice (EBP). Emphasis is placed on understanding the process, concepts, implementation, EBP in respiratory care, effectively apply search skills in locating relevant evidence in various electronic databases, applying statistics, judging the value of published studies with particular emphasis on statistical and clinical significance, integrating and justifying clinical conclusions.

RESP446 Patient Care Independent Study (1-3 Credit Hours): This clinical application course is conducted in various clinical affiliates as assigned by the Director of Clinical Education. Experiences serve as an optional, elective, intensification, and remediation of clinical coursework under the direct supervision, guidance, and mentoring of selected clinical preceptors.

RESP450 Clinical Elective (1-3 Credit Hours): This advanced clinical preceptor-facilitated clinical application course is conducted in various clinical affiliates. Experiences serve as an optional, elective intensification of clinical coursework under the direct supervision, guidance, and mentoring of selected clinical preceptors.

RESP496 Teaching Independent Study (1-3 Credit Hours): The student is paired with an educator in one of the Department’s affiliate organizations and/or with faculty within the academic department itself. The student works with the guidance of this mentor/these mentors to assist him/her/them in one or more of the following teaching venues: clinical laboratory, classroom, clinical, community.

RESP497 Research Independent Study (1-3 Credit Hours): The student is paired with an experienced researcher in one of the Department’s affiliate organizations and/or with faculty within the academic department itself. The student works with the guidance of this mentor/these mentors to assist him/her/them in a new and/or on-going research project.

RESP498 Leadership/Management Independent Study (1-3 Credit Hours): The student is paired with a manager/leader/supervisor in one of the Department’s affiliate organizations. The student works with the guidance of this mentor and/or his/her designee to assist the mentor in a mutually agreed upon project that somehow assists the mentor in the operations within the affiliate organization.
College of Medicine

SUNY Upstate Medical University's College of Medicine has been educating students to become doctors for almost 175 years. Our nationally recognized faculty received their medical training at some of the most prestigious medical schools, residency and fellowship programs in the country. Our students are motivated and driven, yet very supportive of one another. All of this translates into an excellent education, which is evident in our graduates' success. The College of Medicine at SUNY Upstate Medical University traces its origins to 1834 and to Geneva, New York, home of one of the nation’s first medical schools. While still in its infancy, the Geneva Medical School gained the distinction of admitting Elizabeth Blackwell who became the first woman in the United States to graduate from medical school (first in her class!). In 1871, the Geneva Medical School moved to Syracuse to join the newly formed Syracuse University. In 1934, President Franklin D. Roosevelt laid the cornerstone of what is now Weiskotten Hall, Upstate Medical University’s main basic sciences/instruction/laboratory complex. In 1950, the College of Medicine was transferred from Syracuse University to the newly organized State University of New York as one of two regional medical centers, the other in Brooklyn. The College of Medicine at Syracuse formed the core of the then Upstate Medical Center.

MD Program
CIP Code: 51.1201

Fully accredited by the Liaison Committee on Medical Education, the MD Curriculum is ever evolving to meet the needs of students and to address the health of patients. The plan of instruction and required courses outlined below may be modified subsequent to publication of the Academic Catalog. For further information, please contact the Associate Dean for Undergraduate Medical Education.

Objectives and Plan of Instruction

Faculty of the College of Medicine believe that broad exposure to both basic sciences and clinical disciplines is the best preparation for a medical career in a rapidly evolving health care environment. The curriculum provides integrated teaching of basic and clinical sciences throughout the four years. The Graduation Competencies and Educational Program Objectives of the College of Medicine are defined and approved by the Curriculum Committee and disseminated to all faculty, students, and others responsible for the educational process. These objectives for the medical education program serve as statements of what students are expected to learn or accomplish during the course of medical school at Upstate and assessments are driven from them. They are statements of the items of knowledge, skills, behaviors, and attitudes that medical students are expected to exhibit as evidence of their achievement and as a basis for the next stage of their training. The Graduation Competencies and Educational Program Objectives are available online at: (http://www.upstate.edu/com/curriculum/objectives.php).

Program Options

Syracuse Campus

Students who take their third and fourth year clerkships and electives on the Syracuse campus rotate through University Hospital, the Golisano Children’s Hospital, the Veterans’ Administration Hospital, Crouse Hospital, Hutchings Psychiatric Hospital, and a variety of clinic and private ambulatory practice sites throughout central New York. University Hospital sponsors a Level I Trauma Center and its Poison Control Center services half of the counties in New York State. University Hospital includes multiple primary care and specialty programs, including the Upstate Cancer Center, the Upstate Stroke Center, the Clark Burn Center, the Designated AIDS Center (DAC), and the Joslin Center for Diabetes.

Binghamton Campus

The Binghamton Campus was established as a branch campus of the College of Medicine in 1976. Through its clinical affiliates, the Binghamton program offers the same required clerkships as the Syracuse program. United Health Services Hospitals consists of Wilson Memorial Regional Medical Center, Binghamton General Hospital and a network of family care centers. Wilson Memorial offers all of the clinical services associated with a large, acute-care facility including a perinatal center, neonatal intensive care unit, Level II Trauma Center, cardiac center and center for neuroscience. Binghamton General includes a center for reconstructive surgery, a renal dialysis unit, a sleep disorders unit, mental health services and substance abuse services. Our Lady of Lourdes Memorial Hospital is the regional radiation center for cancer treatment and has a hospice program. There is an emphasis on community-based medicine, continuity with attending physicians, and continuity with patients.

MD Curriculum Overview

Required First Year Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecules, Cells &amp; Microbes</td>
<td>8</td>
</tr>
<tr>
<td>Musculoskeletal System</td>
<td>5</td>
</tr>
<tr>
<td>Nervous System I</td>
<td>6</td>
</tr>
<tr>
<td>Cardiovascular, Respiratory I</td>
<td>5</td>
</tr>
<tr>
<td>Urinary, Respiratory II</td>
<td>4</td>
</tr>
<tr>
<td>Gastrointestinal I</td>
<td>5</td>
</tr>
<tr>
<td>Endocrine, Reproductive</td>
<td>4</td>
</tr>
<tr>
<td>Patients to Populations: Ethics, Law and Population, Health</td>
<td>2.5</td>
</tr>
<tr>
<td>Foundations of Reasoning in Medicine I</td>
<td>2.5</td>
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<tr>
<td>Practice of Medicine I</td>
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Required Second Year Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Foundations and Skin</td>
<td>5</td>
</tr>
<tr>
<td>Hematology and Oncology</td>
<td>4</td>
</tr>
<tr>
<td>Nervous System II</td>
<td>6</td>
</tr>
<tr>
<td>Cardiovascular and Respiratory</td>
<td>4</td>
</tr>
<tr>
<td>Renal, Reproductive, Endocrine</td>
<td>5</td>
</tr>
<tr>
<td>Gastrointestinal II</td>
<td>5</td>
</tr>
<tr>
<td>Practice of Medicine II</td>
<td>8</td>
</tr>
<tr>
<td>Foundations of Reasoning in Medicine II</td>
<td>5</td>
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<td>TOTAL YEAR 2</td>
<td>42</td>
</tr>
</tbody>
</table>

MD Course Descriptions

http://www.upstate.edu/com/curriculum/courses/index.php

First Year

MMCM102 Molecules, Cells and Microbes (MCM) (8 Credit Hours): This 8-week course, spanning Units 1 and 2, presents foundational material in the subject areas of Bacteriology, Virology, Parasitology, Cell and Molecular Biology, Microscopic Anatomy, Biochemistry, Genetics, Developmental Biology and Immunology. This material will be enhanced by frequent illustration of patient care applications in lectures, clinically oriented small group sessions, and microscopic anatomy laboratories. The primary purpose of this course is to prepare students for systems-based coursework, which begins in Unit 3 of MS1 and extends through the end of the MS2 year.

MMSK102 Musculoskeletal (5 Credit Hours): Students will learn the clinical implications and physiology of normal and microscopic anatomy of the musculoskeletal system, including muscles, bones, neurovascular supply, and joint structures. Students will learn the normal gross and microscopic anatomy of the skin including surface anatomy and an introduction to cadaver dissection. The basic physiological processes involved in maintaining homeostasis are examined throughout this course. During this Unit, students will be given multiple clinical cases to enhance their learning. Learning will be enriched by case-based sessions, radiologic demonstrations, hands on laboratory work, and clinically oriented small groups.

MNSY101 Nervous System I (6 Credit Hours): This Unit will provide students with current scientific knowledge of human nervous system structure and function. Students will also begin to develop an understanding of abnormalities in nervous system structure/function and disease states. Instruction will include primary exposure to, and appreciation of, how nervous system pathology manifests in abnormal clinical and laboratory findings.

MCVR101 Cardiovascular, Respiratory I (5 Credit Hours): This Unit will emphasize medical knowledge as it applies to cardiovascular and respiratory disease. Learning objectives include anatomic structure and physiologic function of the heart, lungs, airways and blood vessels. These structures will be studied in the neck and thorax with continuity of the circulatory, nervous, and major structures between the regions. Radiographic imaging and clinical testing modalities such as electrocardiograms (EKGs) will be presented to support integration and application of clinical content. Large lectures, small group studies, and case-based sessions will reinforce Unit learning objectives and engage the student for development of life-long learning skills.

MURR101 Urinary, Respiratory II (4 Credit Hours): After the completion of this Unit, students will be able to describe the micro and macro function of the urinary system as well as the upper airway respiratory system. Student will demonstrate a strong understanding of the mechanisms of renal physiology, and respiratory physiology in preparation for year 2 when pharmacology and pathology of the kidney and lungs will be discussed. These foundations will allow students to successfully interpret clinical scenarios encompassing, but not limited to, laboratory studies, radiologic studies, and clinical case scenarios.

MGSI101 Gastrointestinal I (5 Credit Hours): This Unit will provide a comprehensive and thorough coverage of the normal gastrointestinal tract. Special attention will be given to specific disease states and clinical presentations, and how they arise from both changes in physiology, cell structure and the underlying metabolic disruptions. Upon completion of this Unit, students will be expected to interpret, integrate and demonstrate the structural metabolic and physiological function of the GI tract in a normal state. Students will also be able to relate the normal state to the disease state.

MENR101 Endocrine, Reproductive (4 Credit Hours): In this Unit, students will learn to recognize and understand the normal structure and function of the major endocrine and reproductive organs and glands. This includes the hypothalamus, pituitary, adrenal, thyroid, parathyroid, pancreas, gonads, and reproductive organs. Foundational lectures on vitamins and minerals are also included. Students will gain an understanding of the intricate interplay of hormonal pathways that contribute to normal endocrine and reproductive function. Using clinical, laboratory, radiology and pathologic data, students will begin to identify the ways in which the balance of these systems can be disturbed, leading to common and uncommon endocrine and reproductive disorders.

MPTP101 Patients to Populations: Ethics, Law and Population Health (2.5 Credit Hours): This is a longitudinal, case-based course in bioethics, law, population health, epidemiology, healthcare policy, and related disciplines. The course begins with a series of foundational lectures during Unit 1. In Units 2 through 8, students will meet regularly with peers and expert faculty facilitators from the Center for Bioethics and Humanities and the Department of Public Health and Preventive Medicine to engage in case-based small group discussion. All cases begin with an encounter between patient and physician and work outward to a discussion of health systems, policy and
students integrate scientific knowledge and clinical content by working closely with clinicians in small groups learning to perform clinical examinations and interviews, and learning to develop communication skills essential in quality patient care. Students will have online lectures, reading and physical examination videos that complement their small group learning. Students will learn how to develop problem lists, differential diagnoses and how to efficiently present patients to their peer colleagues.

**Second Year**

**MFSK201 Foundations & Skin** (5 Credit Hours): This first Unit will prepare you for rest of the MS2 year and the Step 1 exam by focusing our attention on principles of pharmacology and general pathology. The foundations of pharmacology and pathology will include mechanisms of drug effects, cell injury and death, tissue repair and regeneration. We will then consider the pathogens responsible for, and the treatment of, skin infections.

**MHON201 Hematology & Oncology** (4 Credit Hours): Unit 2 covers disorders of blood and cancer. Disorders of blood include defects in the development of blood cells, bone marrow and blood clotting factors. Inherited and acquired conditions will be discussed and use of blood components in transfusion medicine will be emphasized. We will then turn to some general concepts of cancer including causes, prognosis, treatments, and immune responses. Recent breakthroughs in drug development and bone marrow transplant will be presented.

**MNSY201 Nervous System II** (6 Credit Hours): Unit 3 “Nervous System” will provide a vertical integration with the anatomy and physiology of the nervous system studied in the first year, as well as a horizontal integration between behavioral sciences, pathology and pharmacology of the nervous system in the second year. Students will be guided toward a clear understanding of human behavior, behavioral manifestations of illness, psychopathology, diagnosis and treatment of psychiatric disorders, including the pharmacological principles of modern therapeutics (mechanism of action, clinical indications and side effects of the drugs). CNS and muscle pathology will be described with an emphasis on common tumors in adult and pediatric populations, as well as common neurodegenerative conditions. Modern evolving areas such as chronic traumatic encephalopathy and molecular features of tumors will be covered. Eye, and head and neck pathology, will also be discussed. Histologic features and prognosis will be emphasized.

**MCVR201 Cardiovascular & Respiratory II** (4 Credit Hours): This Unit builds on the foundation of MS1 Unit 5. Students will use their knowledge of normal cardiac and pulmonary function as they learn to differentiate the deficiencies associated with infection, neoplasm, and anatomical pathology. Successful learners will be able to describe the common diseases that affect these systems, the most useful imaging and laboratory tests for differentiating among them, and the first-line treatments. When the first-line treatment is pharmacological, the Unit will include discussion of dosage and side effects. Lectures will include multiple examples of clinical relevance, and will coordinate, as do all other units, with case-based learning in the Foundations of Reasoning in Medicine course and clinical learning in the Practice of Medicine course.

**MENR201 Renal, Reproductive, Endocrine** (5 Credit Hours): The home stretch! Students enter this Unit coming off of winter break and anxious about the year in which they take Step 1. High yield clinical content in the Unit includes syphilis, systemic lupus erythematosus, sexually transmitted infections, arthritis, gout, breast cancer, and male and female reproductive pathology. Renal pathophysiology receives comprehensive attention in this Unit. Pituitary, thyroid, adrenal, and bone pathology, including derangements in metabolic homeostasis, will be covered. The pharmacology related to treating alterations within endocrine axes will be coupled with clinical case discussions. Congenital and consequent neonatal infection will be surveyed. Step 1 relevance will be maintained throughout by citing histopathologic, laboratory, radiographic, and patient characteristics that betray the mechanistic underpinnings of disease, which drive the Step 1 examination.

**MGSI201 Gastrointestinal II** (5 Credit Hours): This Unit builds on the foundations of MS1 Unit 7 and MS2 Unit 5. Students will use their knowledge of normal endocrine and digestive function to understand the deficiencies associated with infection, neoplasm, and anatomical pathology of the pancreas, liver, and GI. Successful learners will be able to describe the common diseases that affect these systems, their clinical manifestations, the most useful imaging and laboratory tests for differentiating among them, and their first-line treatments. When the first-line treatment is pharmacological, the Unit will include discussion of dosage and side effects. Lectures and team-based learning sessions will include multiple examples of clinical relevance, and will coordinate with case-based learning
in the Foundations of Reasoning in Medicine course and clinical learning in the Practice of Medicine course.

**MPOM201 The Practice of Medicine II (8 Credit Hours):** Students will further master efficient medical interviewing, physical examination and communication skills with patients. Students will explore how to synthesize data gathering information into a plausible explanation of the patient’s health status. Students will learn patterns of disease and syndromes in a small group setting with peers and by working closely with standardized patients. They will also continue to develop their skill at efficiently presenting a patient in, and develop initial treatment plans for, a variety of common diagnoses seen in clinical practice.

**MFRM201 Foundations of Reasoning in Medicine II (5 Credit Hours):** This longitudinal course is primarily designed to teach the clinical reasoning skills necessary to evaluate patients, understand disease and make rational, evidence-based decisions. As with FRM-1 students will also be expected to become proficient in peripherally related skills including the domains of ethics, law, biostatistics, epidemiology, economics, public policy, medical anthropology and sociology, and population health. These goals will be accomplished through small group sessions. During these sessions students will be expected to work through clinical cases in order to elicit the main teaching points of the sessions, develop differential diagnoses, and concept maps for the diagnosis and treatment of the disease their simulated patients will possess. In addition, Evidence Based Medicine (EBM) is a component of this course.

### Required Third Year Clerkships:

<table>
<thead>
<tr>
<th>Field</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Medicine</td>
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<tr>
<td>Family Medicine</td>
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<tr>
<td>Psychiatry</td>
<td>5</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>5</td>
</tr>
<tr>
<td>Neuroscience</td>
<td>5</td>
</tr>
<tr>
<td>Obstetrics/Gynecology</td>
<td>5</td>
</tr>
<tr>
<td>Surgery and Surgical Subspecialties</td>
<td>7</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>3</td>
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<tr>
<td>Clinical Bioethics</td>
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<tr>
<td>Population Health for Physicians</td>
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<td><strong>TOTAL YEAR 3</strong></td>
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### Required Fourth Year

<table>
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<tr>
<th>Field</th>
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<tbody>
<tr>
<td>Electives</td>
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<tr>
<td>March Into Residency</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL YEAR 4</strong></td>
<td><strong>28</strong></td>
</tr>
</tbody>
</table>

### Third Year Clerkships

**Medicine, Syr/Bing Course #MDCN2000 / 2100 (10 Credits).** Through active participation in the care of inpatients and outpatients, the third-year student continues to develop knowledge and skill in diagnosis and acquire experience in the fundamentals of treatment. Students take medical histories, perform physical examinations and outline programs of treatment on assigned patients. Understanding of the biochemical, physiological and psychosocial phenomena which underlie the patients illnesses is developed in conferences and seminars.

**Family Medicine, Syr/Bing Course #FAMP1600 (5 credits).** This ambulatory-based clerkship provides training in the basic tenets of primary, family-based care. Clinical preventive medicine and the treatment of acute and chronic diseases are emphasized in both clinical and didactic aspects of the clerkship. The goals of the clerkship are for every medical student to:

- have point-of-care training in a family doctor's office
- demonstrate competence in the core knowledge and skills of family medicine
- understand the role of the family physician

Additionally, students will recognize that high quality information, balanced with patient preferences and clinical judgment, is the basis for intelligent decision making. Developing an understanding of the intellectual process and acquiring the skills for life-long learning will assist students in achieving the goals of the Family Medicine Clerkship.

**Psychiatry, Syr/Bing Course #PYCH6800 / 6900 (5 credits).** In this five-week clerkship, students learn interviewing techniques, refine diagnostic skills, prepare case studies and participate in the treatment programs of the ward to which they are assigned. Liaison/consultation psychiatry is also emphasized. Students learn to evaluate patients in the ER and outpatient clinics. Faculty provide seminars to review psychopathology and treatment methods.

**Pediatrics, Syr/Bing Course #PEDS5600 / 5800 (5 credits).** Provides students with a basis for understanding the interrelationships of growth factors and development in health and disease. Students develop basic skills in taking pediatric histories; perform physical examinations on newborns, infants and older children; assess the children’s developmental levels; and interpret clinical data. Preventive pediatrics is emphasized.

**Neuroscience, Syr/Bing Course #NEUR3000 / 2800 (5 credits).** This five-week clerkship integrates neurology and neurosurgery instruction. Students see common and uncommon neurological disorders and obtain concentrated training in taking a neurological history and performing a neurologic examination. A core curriculum emphasizes neurologic topics common in general practice. Core Topics in Ophthalmology are also included.

**Obstetrics/Gynecology, Syr/Bing Course #OBGY3600 / 3800 (5 credits).** Core lectures and active participation in patient care form the basis for this clerkship. Provides clinical opportunities for students to develop skills and knowledge related to antepartum care, management of normal labor and delivery, care of the newborn, postpartum care, and common ambulatory and inpatient gynecologic concerns.
Surgery and Surgical Subspecialties, Syr/Bing Course #SURG8200 / 8300 (7 credits). During this clerkship, the student participates in the care and management of patients on general surgical services as well as subspecialty services. Bedside and operating room instruction is supplemented by lectures on selected surgical topics. Students learn to recognize problems of a surgical nature, to understand the relevant pathophysiology and to gain some familiarity with surgical therapy.

Emergency Medicine, Syr/Bing Course #EMED1300 / 1400 (3 credits). This three-week rotation introduces students to core concepts and principles in Emergency Medicine. Emphasis is on focused history and physical examination skills, developing a differential diagnosis, and developing clinical care plans. Principles of trauma care, shock and critically ill patients, and other acute life threatening illness will be taught in the clinical setting as well as in the Simulation Center.

Clinical Bioethics, Syr/Bing Course # CBHX2400 / INTD9500 (1 Credit). In this longitudinal concurrent case-based course which spans the third year, students meet in small groups with a faculty tutor to discuss ethical issues presented in patient care and practice communication skills. Students bring their own cases for discussion, and faculty provide other cases to provide the opportunity to discuss and learn about ethical principles and a method of case analysis for ethical concerns raised in patient care. Advanced communication skills are addressed in this course.

Population Health for Physicians, Syr/Bing Course #PRVM6400 (0.5 credits). A longitudinal course covering public health, clinical prevention and emergency preparedness topics during the clinical rotations.

Elective Program (25 required credits)

Students may select from more than 200 elective courses listed in the Course Selection Book. Electives are offered at University Hospital, the Binghamton Clinical Campus, and affiliated institutions. Electives may also be taken extramurally. Students are encouraged to consult their advisors to design an elective program that meets their individual interests and needs. A minimum of 9 elective credits must be taken outside of any one specific department, and only 12 of the required elective credits may be taken in an extramural experience. Students may take more than the minimum required number of elective credits. In the clinical years, all students will participate in a required Basic Science Selective. Students will choose one or more of many electives in basic science or integrated basic/clinical science to study in depth for two weeks. Students will be required to have completed at least six months of clinical clerkships before enrolling in the required basic science selective.

Additional Requirements

Candidates for graduation must:
1. Satisfactorily complete the required and elective curriculum.
2. RemEDIATE any academic deficiencies incurred.
3. Be in good standing (i.e. not on academic or disciplinary probation).
4. Pass Step 1 of the United States Medical Licensing Exam (USMLE) in order to progress into the clinical years.
5. Pass Step 2 Clinical Skills and Clinical Knowledge.
7. Satisfy all financial obligations due to the Upstate Medical University, including at least eight semesters of tuition (except transfer students and students admitted with advance standing who must pay two semesters of tuition for every year of medical education completed at Upstate Medical University).

The Rural Medical Scholars Program (RMSP)/RMED
http://www.upstate.edu/student-handbook/medicine/special-opportunities.php

The University has been providing rural training opportunities since the 1960s. The Rural Medical Scholars Program (RMSP)/RMED was created in 2007 to actively identify, recruit and nurture those interested in future rural practice. The University’s commitment to rural training means that the Office of Admissions seeks small town applicants and provides a holistic review of their applications for the College of Medicine. Interested applicants apply by selecting the Rural Medicine Supplemental option on Upstate’s secondary application. RMSP is not a clinical track program, but we indeed offer four years of elective training in rural health. Once admitted into the College of Medicine, RMSP students are automatically enrolled in the preclinical course, Introduction to Rural Health (FAMP1646). RMSP students may elect to continue on the rural training path by enrolling in clinical, rural community-based electives. Medical students not admitted through RMSP are welcome to join rural health electives with approval from the Program Director, Carrie Roseamelia. Rural health programming includes the following courses:

FAMP1646 Introduction to Rural Health (2 Credits):
PREREQUISITES: None. PERIODS OFFERED: Concurrent, this course is not available in the elective lottery. The elective runs concurrently across the two preclinical years. This lecture-discussion course provides topical sessions on the state of rural health. Sessions may include mental and behavioral health, substance abuse disorders, wilderness medicine, caring for military families, farming and occupational health, and such. Physicians and community leaders from across the state provide their perspectives on the challenges and benefits of serving rural communities. The course meets once a month for 2.5 hours, August through March.
SUNY Upstate Medical University offers the Central New York Master of Public Health Graduate Degree Program. The Master of Public Health is a professional degree which provides a population-based perspective and is designed to prepare students to investigate and manage public health problems. CNYMPH students strive to understand public health problems and to develop innovative methods to improve the health of their communities and larger populations. Graduates of the program will be prepared to assume leadership roles to reduce preventable diseases, injuries, and health disparities through a specialized focus on either data and analytics or population health for clinicians.

The CNYMPH is accredited by the Council of Education for Public Health (CEPH), the independent agency recognized by the US Department of Education to accredit graduate schools of public health and certain public health programs outside of the schools of public health. CEPH assists schools and programs in evaluating the quality of their instructional, research, and service efforts, and grants accreditation to those schools and programs that meet its published criteria.

Programs

The plan of instruction and required courses outlined below may be modified subsequent to publication of the Academic Catalog.

Master of Public Health Degree (MPH)
http://www.upstate.edu/cnymph/index.php

The CNYMPH degree program accommodates both the full- and part-time student. Full-time students may complete the degree in 24 months, while the flexible part-time study plan allows the student up to five years to complete the degree. As an interdisciplinary degree, the CNYMPH program offers our students flexibility in regards to their interest and career aspirations. The diversity and complexity of today's public health concerns require professionals to have a broad base of knowledge, skills and experiences. The MPH degree requires a minimum of 42 credit hours distributed as follows:

24 credits are Foundational Courses, 3 credits each:
- Principles of Epidemiology
- Principles of Biostatistics
- Principles of Environmental Health
- Social and Behavioral Dimensions of Public Health
- Public Health Policy
- Public Health Administration
- Public Health Research Methods
- Program Planning and Evaluation

Students complete an additional 12 credits in their focus area, Field Placement (3 credits) and at least 3 credit hours of electives. Elective Courses are listed in the Course Selection Book.

CNYMPH Program
CIP Code: 51.2207
http://www.upstate.edu/cnymph/index.php
The CAS is a five (5) course, fifteen (15) credit hour program designed to train students in the essential functions of public health practice. All five (5) of the required courses are existing foundational MPH courses required for degree seeking students. The certificate is designed for part-time study to accommodate the working professional. The certificate can be completed within a three semester (Fall, Spring, Summer) block with admission during the fall semester. All requirements for the certificate program must be completed within a period of five years from entry into the program.

The five required courses are:
- Principles of Epidemiology
- Principles of Biostatistics
- Principles of Environmental Health
- Social and Behavioral Dimensions of Public Health
- Public Health Administration

The CNYMPH Curriculum is undergoing revision for 2019/2020. Both courses and credits will be modified from those described in this 2018/2019 catalog. Please contact Dr. Martha Wojtowycz (wojtowym@upstate.edu), Program Director, for any questions about the future curriculum.

Foundational Course Descriptions

MPHP601 Principles of Epidemiology (3 Credit Hours): This course introduces the basic principles of epidemiology applied to public health problems. The focus of this course is on epidemiologic measures and study designs. Topics covered in this course include disease transmission, morbidity and mortality, surveillance, screening, descriptive and analytic study designs, bias, measures of association, causation, and ethical and professional issues in epidemiology. The application of epidemiology for the evaluation of health services and screening programs and the influence of epidemiology on public policy will be presented.

MPHP602 Principles of Biostatistics (3 Credit Hours): This course introduces the basic principles of biostatistics and requires students to apply these principles to describe and analyze public health data. Topics include descriptive statistics, probability distributions, point and interval estimation of population parameters, and hypothesis testing. A variety of one- and two-sample parametric and non-parametric tests for continuous and categorical data are also covered, as are one-factor ANOVA and simple linear regression. Students will analyze data using SPSS software, interpret results and present findings in a variety of formats.

MPHP603 Principles of Environmental Health (3 Credit Hours): Topics focus on approaches to the characterization and management of environmental health risks. Students will develop an understanding of the physiological mechanisms by which exposure to environmental chemicals and biological agents can impact the human health and how the risk of population exposure to environmental hazards is evaluated and mitigated. Common environmentally related diseases and their causes are presented. Regulatory approaches to the prevention of health impacts caused by chemicals and biological agents in water, food, consumer products, and the uncontrolled disposal of sanitary, municipal and industrial waste are reviewed.

MPHP604 Social and Behavioral Dimensions of Public Health (3 Credit Hours): This course introduces the explanatory models of health behavior and health education dominant in the professional field of public health. The course uses the critical perspectives of medical anthropology to examine how public health policy, practice, and research might engage more successfully with the public. We compare health-related beliefs, behaviors, and practices across populations, social categories, and health systems to elucidate the factors determining health disparities and to suggest modes by which the public health profession might best address these.

MPHP606 Public Health Policy (3 Credit Hours): The primary objective of this course is to introduce students to the broad context of public health policy in the United States. Students will develop skills in policy development as well as policy analysis and will learn how policies impact the health of communities. This course explores the legal foundations of public health policy and ethical frameworks for policy analysis, as well as the distinction between policy and advocacy. Current policy issues revolving around the U.S. health care system, the Affordable Care Act, and health disparities will be explored as well as specific “hot” policy issues such as the opioid epidemic, gun violence, immigrant health, and more.

MPHP607 Public Health Administration (3 Credit Hours): This course provides students with foundational knowledge of public health core functions and essential services. Students receive a grounding in the fundamentals necessary to approach management and administration of public health organizations. Using the framework of public health accreditation, this course addresses topics such as community health assessment, community engagement, community improvement planning (programs and policies), strategic planning, human resource management, budgeting, quality improvement, and systems thinking.

MPHP657 Public Health Research Methods (3 Credit Hours): This course introduces students to research methods commonly used in public health, and covers quantitative, qualitative and mixed methods approaches. Course topics include identifying a study question and study hypotheses, study design specifics, data acquisition methods, survey construction (questions and format), data management principles, qualitative & quantitative analysis methods, as well as the write up and dissemination of results. Through homework and projects, students will develop a survey, develop and manage a research database using SPSS, run appropriate data analyses in SPSS, interpret and summarize the results, and prepare a presentation of their research findings in a typical poster format used at a scientific meeting.
MPHP660  Program Planning & Evaluation (3 Credit Hours): This course teaches students to systematically plan and evaluate public health interventions. The purpose of this course is to equip students with the knowledge, strategies, and skills required to plan, implement, and evaluate health interventions and health promotion programs. This course provides the basic principles and processes associated with the planning and evaluation cycle: community needs assessment; program plan; evaluation framework; data collection plan to evaluate program outcomes; tools and strategies for collecting and analyzing program data; and disseminate program results.

MPHP698  Field Placement (3 Credit Hours): Field Placement is a 200-hour practicum that immerses the student in one or more aspects of public health operations under the guidance of a field supervisor at a public health agency. This practicum provides the MPH student an opportunity to bridge professional academic preparation and public health practice through a supervised field experience. Knowledge and skills acquired in the five core public health courses and the elective courses are applied in an agency setting. The field experience component of the MPH degree program plays a vital role in training students to assume public health leadership positions.

MPHP699  Culminating Experience (3 Credit Hours): Designed to synthesize and integrate all of the public health theory, knowledge, and skills gained throughout the CNYMPH Program curriculum, this requirement allows the student to demonstrate proficiency in mastering the required health competencies in a final project. The student is expected to conduct a Capstone Project, produce a Master’s level written product, and an oral presentation as their culminating experience.

Data and Analytics Courses
(Additional courses will be offered beginning in academic year 2019/2020)

MPHP655 Advanced Epidemiology (3 Credit Hours) This course will apply advanced principles and methods in epidemiologic research. The focus of this course will be on the design, conduct, analysis and interpretation of epidemiologic studies. Topics will include the development of research questions and hypotheses, selection of an appropriate study design, sampling methodologies, sample size calculations, data collection and measurement techniques, reliability and validity, selection of appropriate statistical tools, evaluation of bias, confounding and effect modification.

MPHP 661 Advanced Biostatistics (3 Credit Hours): This course focuses on applying general principles and methods of general linear modeling to the analysis of continuous and categorical data. Topics include simple and multiple linear regression, logistic regression, single and multi-factor analysis of variance (ANOVA), analysis of covariance (ANCOVA) and ANOVA for repeated measures. Knowledge of course content will be applied to the development and completion of a research project. Project components will include formulation of research questions and hypotheses, evaluation and selection of public access or other available datasets for research, data cleaning and analysis using statistical software, and interpretation and presentation of results in graphic and oral formats.

Population Health for Clinicians Courses
(Additional courses will be offered beginning in academic year 2019-2020)

MPHP649 Public Health and Biopsychosocial Primary Care (3 Credit Hours): This course is intended for students with clinical interests or backgrounds, and covers the application of the Biopsychosocial Model of Care to primary care settings. In the process, students apply population-level, public health skills to the management of individual patients or clients. The course includes discussion of cultural competency and humility, social determinants of health, health disparities, motivational interviewing and stages of change, the chronic care model, and stages-of-change theory. Students encounter a standardized patient who presents with a combination of newly emergent chronic biological illness, co-morbid behavioral symptoms, and social stressors, in a formative session.
The College of Nursing at SUNY Upstate Medical University is the only nursing program in the region that is part of an academic medical university. There are only 134 such universities in the nation and just one in Central New York. It began offering bachelor's and master's degrees in 1984 and currently offers advanced education programs for RNs. Nurses who achieve the advanced degrees offered by the college will be able to practice in a variety of health care settings including ambulatory, home, and long-term care. Graduates of these programs will be tomorrow’s leaders in nursing. The programs in nursing are fully accredited by the Commission on Collegiate Nursing Education of the American Association of Colleges of Nursing (AACN).

Fully accredited by the American Association of Colleges of Nursing, the Nursing Curriculum is ever evolving to meet the needs of students and to address the health of patients and populations. The programs of study and required courses outlined below may be modified subsequent to publication of the Academic Catalog.

**Bachelor of Science Degree**

This degree program is a flexible, upper division program for registered nurses with associate’s degrees or diplomas in nursing. The courses build on, but do not duplicate, the content taught in Associate of Applied Science programs. Our program focuses on theory and application, provides exposure to many areas of nursing, and serves as a foundation for graduate study. It prepares you to deliver comprehensive care to patients and populations of all ages in a variety of settings as a direct care provider and as a nursing leader. Most full-time students complete degree requirements in two years. Part-time students will complete the degree in three or four years. Degree requirements must be completed within five years of matriculation. This program of study lists the courses that are required to meet graduation requirements.

**General Education Requirements (see page 4)**

<table>
<thead>
<tr>
<th>Year One Fall Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS326 Conceptual Bases/Professional Nursing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL325 Professional Writing</td>
<td>3</td>
</tr>
<tr>
<td>NURS414 Healthy Aging</td>
<td>3</td>
</tr>
<tr>
<td>PATH360 Pathology</td>
<td>3</td>
</tr>
<tr>
<td>Free Elective</td>
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<table>
<thead>
<tr>
<th>Year One Spring Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS310 Comprehensive Health Assessment</td>
<td>3</td>
</tr>
<tr>
<td>NURS387 Health Care Policy &amp; Politics</td>
<td>3</td>
</tr>
<tr>
<td>NURS415 Management in Nursing</td>
<td>3</td>
</tr>
<tr>
<td>NURS481 Research in Nursing</td>
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<tr>
<td>Statistics Elective</td>
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<table>
<thead>
<tr>
<th>Year Two Fall Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS444 Community Health Nursing</td>
<td>4</td>
</tr>
<tr>
<td>NURS456 Information Quality &amp; Safety</td>
<td>3</td>
</tr>
<tr>
<td>BIOL420 Epidemiology</td>
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<td>Free Elective</td>
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<tr>
<td>Free Elective</td>
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<table>
<thead>
<tr>
<th>Year Two Spring Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS465 Nurse as Educator for BS</td>
<td>3</td>
</tr>
<tr>
<td>NURS484 Trends in Practice</td>
<td>3</td>
</tr>
<tr>
<td>Health Care Ethics Elective</td>
<td>3</td>
</tr>
<tr>
<td>Free Elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>15</td>
</tr>
<tr>
<td><strong>TOTAL CREDITS</strong></td>
<td>61 (BS)</td>
</tr>
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</table>

**Lower Division Transfer Credits (Maximum of 12)**

- NURS444 — NURS326
- NURS456 — NURS481

**COURSE PRE-REQUISITES**

- NURS444 — NURS326
- NURS456 — NURS481

**COURSE PRE/CO-REQUISITES**

- NURS444 — BIOL420
- NURS481 — ENGL325; Statistics
- NURS484 — NURS481

^ Must be upper division course

**Master of Science Degree**

The master’s program builds on students’ undergraduate nursing education and focuses on applying advanced theory and evidence-based data to clinical practice. The curriculum includes courses in the advanced practice role, nursing theory, family theory, informatics, quality and safety, leadership and health care policy, research and advanced pathophysiology and pharmacology. Students take practicum courses as electives to strengthen advanced practice skills. Students also may participate in faculty-sponsored research or individual research projects under faculty guidance, or practice teaching. Students complete the program in a two or three year program of study.

**MS Curriculum: Pediatric Nurse Practitioner (PNP)**
This program of study lists the courses required to meet graduation requirements.

### Year One Fall Semester
- NURS565 Nurse as Educator: 3 credits
- NURS612 Family Nursing Theory: 3 credits
- NURS621 Clinical Pathophysiology: 3 credits
- NURS607 Advanced Health Assessment: 3 credits
- **TOTAL:** 12 credits

### Year One Spring Semester
- NURS610 Nursing Theory: 3 credits
- NURS616 Advanced Nursing Research: 3 credits
- NURS640 Pharmacology: 3 credits
- NURS641 Clin Mgmt PNP I: 5 credits
- **TOTAL:** 14 credits

### Year One Summer Semester
- NURS613 Innovation, Quality and Safety: 3 credits
- **TOTAL:** 3 credits

### Year Two Fall Semester
- NURS626 Leadership for APN: 3 credits
- NURS687 Clin Mgmt PNP II: 6 credits
- + Graduate Elective: 3 credits
- Master’s Graduate Project* or NURS700 or Thesis: 0-3 credits
- **TOTAL:** 12-15 credits

### Year Two Spring Semester
- NURS688 Clin Mgmt/PHC PNP III: 6 credits
- + Graduate Elective: 3 credits
- Master’s Graduate Project* or NURS700 or Thesis: 1-3 credits
- **TOTAL:** 10-13 credits

PNP = 51 credits

+ Graduate Elective (500+ or higher graduate level course)
The two required electives (6 credits) may be taken during any semester within the Program of Study (POS).

*A Master’s Graduate Project (CMP) or Thesis is required for graduation. The Thesis option is with approval by the program director and advisor. Refer to the CMP or Thesis section for more information.

**Education Certificate Courses:** NURS655 Curriculum and Program Development and NURS665 Educational Evaluation may be used as an elective or toward Education Certificate. See section on Education Certificate.

### PREREQUISITES
- NURS640 requires NURS621
- NURS655/NURS665 requires NURS565
- NURS686 requires NURS607
- NURS687 requires NURS686
- NURS688 requires NURS687

### PRE/COREQUISITES
- NURS607 requires NURS661
- NURS686 requires NURS612; NURS640
- Master’s graduate project is required if Thesis is not chosen

---

**MS Curriculum: Family Nurse Practitioner (FNP)**

This program of study lists the courses required to meet graduation requirements.

### Year One Fall Semester
- NURS565 Nurse as Educator: 3 credits
- NURS612 Family Nursing Theory: 3 credits
- NURS621 Clinical Pathophysiology: 3 credits
- NURS607 Advanced Health Assessment: 3 credits
- **TOTAL:** 12 credits

### Year One Spring Semester
- NURS610 Nursing Theory: 3 credits
- NURS616 Advanced Nursing Research: 3 credits
- NURS640 Pharmacology: 3 credits
- NURS641 Clin Mgmt/FNP I: 5 credits
- **TOTAL:** 14 credits

### Year One Summer Semester
- NURS613 Innovations in Information, Quality and Safety: 3 credits
- **TOTAL:** 3 credits

### Year Two Fall Semester
- NURS626 Leadership for APN: 3 credits
- NURS642 Clinl Mgmt/FNP II: 6 credits
- + Graduate Elective: 3 credits
- Master’s Graduate Project* or NURS700 or Thesis: 0-3 credits
- **TOTAL:** 12-15 credits

### Year Two Spring Semester
- NURS643 Clinl Mgmt/FNP III: 6 credits
- + Graduate Elective: 3 credits
- Master’s Graduate Project* or NURS700 or Thesis: 1-3 credits
- **TOTAL:** 10-13 credits

FNP = 51 credits

+ Graduate Elective (500+ or higher graduate level course)
The two required electives (6 credits) may be taken during any semester within the Program of Study (POS).

*A Master’s Graduate Project (CMP) or Thesis is required for graduation. The Thesis option is with approval by the program director and advisor. Refer to the CMP or Thesis section for more information.

**Education Certificate Courses:** NURS655 Curriculum and Program Development and NURS665 Educational Evaluation may be used as an elective or toward Education Certificate. See section on Education Certificate.

### PREREQUISITES
- NURS640 - NURS621
- NURS655/NURS665 - NURS565
- NURS641 - NURS607
- NURS642 - NURS641
- NURS643 - NURS642

### PRE/COREQUISITES
- NURS607 - NURS621
- NURS686 requires NURS612; 616; 640
- NURS641 requires NURS612 and NURS655
This program of study lists the courses required to meet graduation requirements.

### Year One Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>NURS565 Nurse as Educator</td>
<td>3</td>
</tr>
<tr>
<td>NURS612 Family Nursing Theory</td>
<td>3</td>
</tr>
<tr>
<td>NURS621 Clinical Pathophysiology</td>
<td>3</td>
</tr>
<tr>
<td>NURS607 Advanced Health Assessment</td>
<td>3</td>
</tr>
<tr>
<td>NURS609 Family Psychiatric &amp; Mental Health Theory</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>15</strong></td>
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### Year One Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS610 Nursing Theory</td>
<td>3</td>
</tr>
<tr>
<td>NURS616 Advanced Nursing Research</td>
<td>3</td>
</tr>
<tr>
<td>NURS640 Pharmacology</td>
<td>3</td>
</tr>
<tr>
<td>NURS627 Clinical Management/FPMHNP I</td>
<td>5</td>
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<td><strong>TOTAL</strong></td>
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### Year One Summer Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>NURS613 Innovations in Information, Quality and Safety</td>
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<td><strong>TOTAL</strong></td>
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### Year Two Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>NURS626 Leadership for APN</td>
<td>3</td>
</tr>
<tr>
<td>+Graduate Elective</td>
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<tr>
<td>NURS628 Clinical Management/FPMHNP II</td>
<td>6</td>
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<tr>
<td>Master’s Graduate Project* or NURS700 or Thesis</td>
<td>0-3</td>
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<tr>
<td><strong>TOTAL</strong></td>
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### Year Two Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS629 Clinical Management/ FPMHNP III</td>
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<tr>
<td>+Graduate Elective</td>
<td></td>
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<tr>
<td>Master’s Graduate Project* or NURS 700 or Thesis</td>
<td>1-3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>10-13</strong></td>
</tr>
</tbody>
</table>

### Credits MS: FPMHNP = 54 credits

(Credits include 54 FPMHNP + Graduate Elective)

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**+ Graduate Elective** (500+ or higher graduate level course)
The two required electives (6 credits) may be taken during any semester within the Program of Study (POS).

*A Master’s Graduate Project* (CMP) or **Thesis** is required for graduation. The Thesis option is with approval by the program director and advisor. Refer to the CMP or Thesis section for more information.

**Education Certificate Courses:** NURS655 Curriculum and Program Development and NURS665 Educational Evaluation may be used as an elective or toward Education Certificate. See section on Education Certificate.

**PREREQUISITES**

- NURS640 requires NURS621
- NURS655/NURS665 requires
- NURS655
- NURS627 requires NURS607; NURS609
- NURS628 requires NURS627; NURS609
- NURS629 requires NURS628

**PRE/Corequisites**

- NURS607 requires NURS621
- NURS609 requires NURS607
- NURS627 requires NURS616;
- NURS640
- NURS628 requires NURS612 and
- NURS655

---

*MS Graduate Projects:*

The Master’s Graduate Project (CMP) option begins in NURS616 Advanced Research. A CMP advisor will be assigned to each student after successful completion of NURS616. The **Thesis** option provides an opportunity for independent nursing research. NURS700 Thesis and a graduate Statistics elective are required. A Thesis Advisor will be assigned.

**Doctor of Nursing Practice**

The on-line, part-time DNP doctoral program is specifically for the master's prepared Nurse Practitioner (NP) or Clinical Nurse Specialist (CNS). This terminal degree provides skills in translation and generation of evidence-based knowledge and expanded skills in leadership, health policy and advocacy, inter-professional practice, and information technology. DNP clinical practice outcomes promote safe, effective, and equitable patient care at the population and system levels, as well as for individual patients.

The part-time post master's DNP degree consists of 40 semester hours, which are completed in seven semesters (approximately 6 credits per semester) and two summer semesters (3 credits per semester) or two and a half years. The Doctor of Nursing Practice program is designed to meet the American Association of Colleges of Nursing (AACN) Essentials of Doctoral Education for Advanced Nursing Practice. This program of study lists the courses the student will be required to complete to meet graduation requirements.

### Year One Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>NURS713 Advancements in Information, Quality and Safety</td>
<td>3</td>
</tr>
<tr>
<td>NURS632 Biostatistics</td>
<td>3</td>
</tr>
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<td><strong>TOTAL</strong></td>
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</table>

### Year One Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS711 Org. Behavior and Systems Leadership</td>
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</tr>
<tr>
<td>NURS620 Legal and Ethical Issues</td>
<td>3</td>
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<td><strong>TOTAL</strong></td>
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### Year One Summer Semester

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<thead>
<tr>
<th>Course</th>
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</tr>
</thead>
<tbody>
<tr>
<td>NURS608 Epidemiology and Population Health</td>
<td>3</td>
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<td><strong>TOTAL</strong></td>
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### Year Two Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS710 Evidence Based Practice</td>
<td>3</td>
</tr>
<tr>
<td>NURS637 Program Development and Grant Writing</td>
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### Year Two Spring Semester

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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>NURS605 Public Health Policy</td>
<td>3</td>
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<tr>
<td>NURS722 DNP Project I (150 hrs)</td>
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### Year Two Summer Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>NURS723 Graduate Elective</td>
<td>3</td>
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</table>
Post-Master DNP Project II (150 hrs.) 3
TOTAL 6

Year Three Fall Semester  Credits
Graduate Elective 3
NURS725 DNP Project III (225 hrs.) 4
TOTAL 7
TOTAL CREDITS 40

Course  Pre-requisite
NURS608  NURS632
NURS637  NURS608
NURS722  NURS710
NURS723  NURS722
NURS735  NURS723

Nursing Education Certificate

This two- to three-semester post master's certificate program prepares nurses with master's degrees in nursing or related fields to be educators— for patients, other nurses, nursing students and the general public. Students who complete receive a certificate upon completion and/or graduation.

Semester One  Credits
NURS565 Nurse as Educator 3
TOTAL 3

Semester Two  Credits
NURS655 Curriculum and Program Development* 3
TOTAL 3

Semester Three  Credits
NURS665 Educational Evaluation* 3
TOTAL 3

TOTAL CREDITS 9

PREREQUISITES:
NURS565 - Pre-requisite to NURS655 & 665
+ NURS565 - Offered both Fall and Spring semesters
++ NURS655 - Offered Spring and Fall semesters
+++ NURS665 - Offered Spring and Fall semesters

*May be used as an elective in the student's Program of Study (POS)

As an alternative to the above option, the student may begin the 3-semester sequence with the spring semester.

Nursing Course Descriptions

Bachelor of Science
http://www.upstate.edu/con/programs/bs/curriculum.php

NURS310 Comprehensive Health Assessment (3 Credit Hours): This course is aimed at broadening the student's knowledge and perspective of health assessment of the individual across the lifespan. Family, cultural, and sociological aspects that influence an individual’s health are explored. Communication skills important in obtaining a comprehensive health history are discussed and practiced. Risk factors and variables, including environmental and genomic influences on health, are studied along with techniques for physical examination. Focus is on the performance of a systematic, comprehensive health assessment and the critical analysis of assessment data.

NURS326 Conceptual Bases/Professional Nursing (3 Credit Hours): This course is the first socialization course for the upper division Registered Nurse. The focus is on the role of the professional nurse and provides an evolutionary
overview of the delivery of foundational professional nursing practices and role transition. Concepts which contribute to professional development such as accountability, communication, ethics and legalities are explored. The course examines principles of evidence-based practice to improve patient safety and outcomes through translating research into professional nursing practice. Students explore the foundation of key concepts essential for promoting effective communication and inter-professional to improve patient care in a rapidly changing healthcare environment.

NURS 387 Health Care Policy and Politics (3 Credit Hours): The focus of this course is on the role of the professional nurse in the political process in the practice setting and in the broader public sector. Particular attention is given to the development of public policy related to health care. Consideration is given to historic, sociologic, technologic, economic, legal, and political factors which influence health care delivery. Analysis of the political action process is used to operationalize the concept of the nurse as an agent of change, client advocate, and participant in decision-making related to health policy.

NURS 414 Healthy Aging (3 Credit Hours): This course focuses on holistic nursing care for the adult population. Transition to adulthood and changes of normal aging and common health problems in adults of all age groups are included. Disease prevention, risk reduction, and health promotion strategies are addressed. Strategies to assist older adults in achieving and maintaining wellness and optimal quality of life are emphasized. In addition, concepts related to the care of patients and their families at the end of life are explored.

NURS 415 Management in Nursing (3 Credit Hours): This course introduces the student to the symbiotic components of nursing management and leadership. An overview of management and leadership theories are examined reflecting the interdependent relationship between the two. Emphasis is placed on the functions of the management process: planning, organizing, staffing, directing, and controlling, as it relates to the role of a nurse manager. Effective communication skills are discussed to facilitate group cohesion and team building.

NURS 420 Ethics, Nursing and the Health Professions (3 credit hours): This course focuses on the integration of the principles and application of ethical decision making in professional practice within health care and the communities served by nursing and other health care professionals. Areas of study will include: a working knowledge of the philosophical principals guiding ethics and codes of ethical practice; the knowledge and skill development needed in identifying the morals, values, and beliefs of the individual patient/client and family/community; and culturally competent and ethically based health care. This course meets the health ethics elective.

NURS 444 Community Health Nursing (4 Credit Hours): PREREQUISITES NURS 326 & BIOL 420. Community health nursing is a blend of two components - public health science with its roots in epidemiology, and the art and science of nursing. Emphasis is on population-focused nursing with application to Healthy People. Students assess a community to identify a priority health need or risk and apply evidence-based interventions at the three levels of prevention. Using available community resources students will plan, implement and evaluate interventions to improve the overall health of communities. Course includes a 45 hours clinical.

NURS 481 Research in Nursing (3 Credit Hours): PRE/CO-REQUISITES ENGL325 & Statistics. Research in Nursing addresses critical inquiry in the development of nursing science. This course is an introduction to the principles of scientific inquiry, including identification of forms of analytical thinking common to problem solving in nursing. Students are guided in the development of critical appraisal skills in the evaluation of both quantitative and qualitative research methodologies and in examining the role of the professional nurse as data collector, designer, producer, replicator, and consumer of research.

NURS 484 Trends in Practice and Health Care (3 Credit Hours): PRE/Corequisite NURS 481 & last semester of POS. This capstone course focuses on the role of the professional nurse in the changing healthcare delivery system. It provides an opportunity for the students to apply and synthesize learning gained in previous course work and experience the care of clients in a variety of settings. The students will choose a clinical experience for the semester in which to complete a project. Student led seminars on select healthcare trends will facilitate the sharing of knowledge obtained from the literature and the clinical experiences will enhance critical thinking and communication.

INTD 435 Palliative Care and End-of-life Education for Healthcare Professionals (3 Credit Hours): This course
explores the physical, psychosocial, spiritual, and ethical issues surrounding the care of persons in need of comfort, palliation and end-of-life care. The course utilizes the standards of care as exemplified in ELNEC (End-of-Life Nursing Education Consortium) and EPEC (Education for Physicians on End-of-Life). The course is designed to encourage and engage interprofessional dialogue and gain a broader perspective of the various disciplines involved in caring for patients and families facing end-of-life.

Master of Science
http://www.upstate.edu/con/programs/ms/index.php

NURS565 Nurse as Educator (3 Credit Hours): The role development of the nurse as an educator and to be an effective communicator of information, and to interact with the client as a partner in his/her own health care planning. This course engages students in the integration of key components of patient education with participation in the processes of assessment, developing, and implementing a patient education session with a specified group of learners. Students analyze web-based and printed educational materials and apply evidence-based findings to promote patient and consumer health seeking behaviors. The impact of health literacy, legal issues, ethical considerations related to patient education is discussed.

NURS610 Nursing Theory (3 Credit Hours): This course focuses on the development of nursing science through the use of nursing theoretical frameworks. Students are guided in the examination of the development of conceptualizations and in the critique of concepts, theories, and boundaries for nursing study, as well as the implications for using theories of nursing and theories in nursing. Emphasis is on critical thinking, via description, analysis, and evaluation of nursing theory for application to practice. The importance of research to the continuing development of nursing theory as a method of building nursing's unique knowledge base is emphasized throughout the course.

NURS612 Family Nursing Theory (3 Credit Hours): This course examines the contemporary family's structure, function, and process. Various theoretical frameworks and models are explored and applied to the nursing assessment of and intervention with the healthy and high-risk family system in a variety of clinical settings. Students utilize a wellness approach to optimize health within a developmental framework and promote family resilience and adaptation throughout the lifespan. Psychosocial, cultural, economic, gender, and spiritual variables and their impact on family life are analyzed.

NURS 613 Innovation in Information, Quality and Safety (3 Credit Hours): This course focuses on the skills and knowledge needed to troubleshoot and analyze problems with the system, promote quality, maintain patient safety, and manage information across healthcare settings. Collaborative and diverse opportunities to bring about improvement in healthcare are evaluated. The course integrates evidence-based concepts from technology, information science, communication studies, patient safety, organizational quality, and health care science preparing nurses to take an active role in transforming healthcare and clinical practice. Emphasis is placed on the nurse's competency in retrieving, interpreting, and sharing information to support an evidence-based clinical practice.

NURS616 Advanced Nursing Research (3 Credit Hours): This Masters level course focuses on issues involved in the appraisal and use of research evidence, and in the conduct of research. Identification and analysis of research related to clinical practice and health care outcomes are included. Evaluation processes relevant to nursing practice are addressed. The course will prepare the student to synthesize the results of existing research in an area of interest, to initiate collaboration with others in developing and continuously improving a practice based on research as evidence, and to understand the research expectations for advanced practice nurses. A basic understanding of research terms, the quantitative research process, and statistics is expected of students who enter the course.

NURS 607 Advanced Health Assessment (3 Credit Hours) Pre/corequisites: NURS 621. This is an entry-level clinical course in which the students integrate basic knowledge of human anatomy and physiology and build on advanced health assessment knowledge. The student develops an understanding of the pathologic changes and clinical manifestations that characterize common acute and chronic disorders. Students apply new understanding of pathophysiology, evolving clinical decision-making skills to the interpretation of assessment data, the diagnosis of illness and the treatment of primary care across the lifespan. Students perform complete health assessments and provide client care with supervision. Collaborative strategy guide the student in the implementation and evaluation of accepted advanced practice nursing interventions and integrate research, teaching and consultation skills as a beginning basis for clinical practice.

NURS 621 Clinical Pathophysiology (3 Credit Hours): Pre/corequisites NURS640. This course focuses on the causality of alterations in human physiologic function across the lifespan. Normal physiology and pathological phenomena produced by altered states of health across the lifespan are contrasted. The human physiologic responses to these altered states are related to pertinent diagnostic values, tests, and methods. This course serves as a basis for subsequent courses that deal with the clinical diagnosis and management of health problems.

NURS 626 Leadership for Advanced Practice Nurse (3 Credit Hours): This course focuses on the skills and knowledge needed by the Advanced Practice Nurse (APN) to function in the role of a leader in health care. Emphasis is placed on the development of individuals as informed and collaborative leaders within the health care system who use current research based evidence in their roles. Utilizing the nursing process, and leadership theory and organizational
theory, students analyze the effectiveness of health care organizations and develop interventions to improve the organizational effectiveness. Issues related to the APN's role as an active participant in the legislation of health care policy are explored.

NURS 609 Family Psychiatric and Mental Health Theory (3 Credit Hours): Pre/Co-requisites NURS 607. This course presents the theoretical basis for anatomical, biological and psychological aspects of advanced practice in psychiatric mental health nursing. Genetic, prenatal and experienced environmental influences are explored in relation to their role in brain development and functions. Emphasis is placed on neurobiological and psychosocial theories, which provide the foundation for current and emerging pharmacological and non-pharmacological interventions. Introduction to theories, concepts and models relevant to the Family Psychiatric Mental Health Nurse Practitioner’s role in the care of individuals with mental illnesses and populations at risk for mental illness are examined.

NURS 627: Clinical Management: Family Psychiatric Mental Health FPMHNP I (5 credit hours): Pre/Corequisites: NURS 609 NURS 616; NURS 640. This course provides the foundation for clinical management of children, adolescents, adults and older adults with common psychiatric mental health problems. A bio-psychosocial framework for understanding the development and treatment of psychiatric disorders and mental health problems is explored. Students are introduced to the process, dynamics, principles and ethical consideration of advanced practice psychiatric nurse interviewing, assessing and diagnosing as well as the initial planning, implementation and evaluation of therapeutic interventions with individuals. Therapies are introduced to promote health and prevent illness for individuals across the lifespan and their families. Psychopharmacotherapeutics and other therapeutic approaches are discussed in relation to their roles in the treatment of mental illness/psychiatric disorders.

NURS628 Clinical Management/FPMHNP II (6 Credit Hours): PREREQUISITE NURS627. This course focuses on advanced knowledge of psychiatric-mental health nursing, including selected mental health problems and psychiatric disorders. Assessment, decision-making and therapeutic interventions with families, groups, and populations at risk are explored. The role of APRNs in the implementation of psychopharmacotherapeutic and integrated biopsychosocial educational and supportive interventions for children, adolescents, adults, and older adults as well as culturally diverse populations is examined.

NURS629 Clinical Management/FPMHNP III (6 Credit Hours): PREREQUISITE NURS628. This course continues to focus on advanced knowledge of psychiatric mental health nursing, including diagnosis and management of children, adolescents, adults and older adults with mental health problems and psychiatric disorders. Societal, ethical and systems issues that affect the advanced practice psychiatric nursing role during the delivery of primary mental healthcare to specialty populations are explored.

NURS640 Pharmacology (3 Credit Hours): PRE-REQUISITE NURS621. An integrative approach to pharmacotherapy is emphasized that utilizes principles of pharmacology, pharmacokinetics, and pharmacodynamics of drug therapies. The characteristics of the major drug classifications and clinical practice implications are addressed as well as the legal and regulatory implications of drug administration and the essentials of prescription writing. The objective of this course is to develop a core of information that may be practically applied to drug utilization in practice as well as the tools for further development of this database.

NURS641 Clinical Management Primary Health Care/FNP I (5 Credit Hours): PRE/COREQUISITES NURS616 & NURS640. Students integrate basic knowledge of human anatomy and physiology and build on advanced health assessment knowledge. The student develops an understanding of the pathologic changes and clinical manifestations that characterize common acute and chronic disorders. Students apply new understanding of pathophysiology, evolving clinical decision-making skills to the interpretation of assessment data, the diagnosis of illness and the treatment of primary care across the lifespan. Students perform complete health assessments and provide client care with supervision. Collaborative strategy guide the student in the implementation and evaluation of accepted advanced practice nursing interventions and integrate research, teaching and consultation skills as a beginning basis for clinical practice.

NURS642 Clinical Management Primary Health Care/FNP II (6 Credit Hours): PRE/REQUISITES NURS641. This course reflects a building of knowledge and skills from Clinical Management in Primary Health Care: Family NP I. Students continue to progress in the nurse practitioner role and in the delivery of health care to individuals with acute and chronic health care needs. In collaboration with the health care team, students are involved in the implementation and the evaluation of accepted medical and nursing interventions used in the care of patients across the lifespan. Effective use of skills required for clinical management, education, consultation, referral, and follow-up are emphasized. Therapeutic interventions based upon evidenced-based research are integrated along with complementary and alternative healing approaches appropriate for individuals and their families with health care problems. Course work, classroom activities, and clinical assignments enhance students' critical thinking and decision-making skills for complex health care problem evaluation.

NURS643 Clinical Management in Primary Health Care: Family NP III (6 credits): PREREQUISITE NURS642. This is a culminating clinical course in which students are managing client care with increasing independence. The collaborative model guides the student in the implementation and evaluation of accepted medical and nursing interventions used in the care of the patients across the lifespan. Students
further develop leadership, research, teaching, and consultation skills as a basis for clinical practice. Practice issues are identified and discussed in a structured environment that incorporates ethical concepts and effective use of resources for beginning autonomous practice. Theoretical concepts of organizational systems and health care politics and policy are applied to the advanced practice setting to identify and solve complex problems.

NURS655 Curriculum and Program Dev (3 Credit Hours) PREREQUISITE NURS565. This course continues the development of the knowledge and skills of the nurse as an educator. While the major emphasis is on the development of faculty for an academic role, the principles of course and program development are applicable for in-service, continuing education, and staff development educators as well. The role, competencies, and responsibilities of the educator in a variety of settings are explored. The process of program and curriculum development is examined in light of the ethical, legal, political, and economic forces and issues that have an impact on the educational process. The evaluation process includes the development of outcome criteria to measure the success of programs and curricula. Using seminar and other adult learning formats, students have the opportunity to develop educational course content and, at the same time, design, apply, and critique creative learning strategies that foster critical thinking and active participation.

NURS665 Educational Evaluation (3 Credit Hours) PREREQUISITE NURS565. This course is one in a series of three courses leading to a certificate in education. Students focus on assessing, advising, and evaluating the learner from the time of admission to the completion of an academic program or other type of educational endeavor. A major emphasis is on exploring creative evaluation strategies, using various methodologies to determine learner performance in classroom, laboratory, and clinical settings. The evaluation process focuses on test development, including techniques for writing examinations, and determining the reliability and validity of tests. Students are given the opportunity to develop their knowledge and skills as educators by actively participating in seminars, other adult learning approaches, and practicum experiences. Individually designed practicum experiences allow students to gain a broader perspective on the educator role as well as to practice some of the skills of the educator.

NURS686 Clinical Management Primary Health Care/PNP I (5 Credit Hours): PREREQUISITE NURS607 PRE/ COREQUISITES NURS616 & NURS640. This is an entry level clinical course in which the students integrate basic knowledge of human anatomy and physiology and build on advanced health assessment knowledge. The student develops an understanding of the pathologic changes and clinical manifestations that characterize common acute disorders. Students apply new understanding of pathophysiology, evolving clinical decision making skills to the interpretation of assessment data, the diagnosis of illness and the treatment of primary care in infants, children, adolescents and young adult populations. Students perform complete health assessments and provide client care with supervision. Collaborative strategy guide the student in the implementation and evaluation of accepted medical and nursing interventions and integrate research, teaching and consultation skills as a beginning basis for clinical practice.

NURS687 Clinical Management Primary Health Care/PNP II (6 Credit Hours): PREREQUISITE NURS686. This course reflects a building of knowledge and skills from the previous clinical course, NURS 686, PNP I. The student continues to progress in the nurse practitioner role and in the delivery of health care to infants, children, adolescents and young adults with acute and chronic health care needs. Collaboration with the health care team, guides the students in the implementation and the evaluation of accepted medical and nursing interventions used in the care of the child health population. Effective use of skills required for clinical management, education, consultation, referral, and follow-up are emphasized. Therapeutic interventions based upon evidenced based research are integrated along with complementary and alternative healing approaches appropriate for the child health population. Course work, classroom activities, and clinical assignments enhance the student’s critical thinking and decision-making skills, specifically for complex health care problem evaluation.

NURS688 Clinical Management Primary Health Care/PNP III (6 Credit Hours): PREREQUISITES NURS687. This is a culminating clinical course in which students are managing client care with increasing independence. The collaborative model guides the student in the implementation and evaluation of accepted medical and nursing interventions used in the care of infants, children, adolescents and young adults. Students further develop leadership, research, teaching, and consultation skills as a basis for clinical practice. Practice issues are identified and discussed in a structured environment that incorporates ethical concepts and effective use of resources for beginning autonomous practice. Theoretical concepts of organizational systems and health care politics and policy are applied to the advanced practice setting to identify and solve complex problems.

NURS700 Thesis (1 – 6 Credit Hours, total of 6 credit hours): Provides an opportunity to independent research. It is the culmination of the research sequence with the application of research theory and process to a specific researchable problem related to nursing.

Doctor of Nursing Practice
http://www.upstate.edu/con/programs/dnp/index.php

NURS605 Public Health Policy (3 Credit Hours): The purpose of this course is to critically analyze the ways in which public policy affects local and global health processes and outcomes. Students examine the broad context of health and social policy that impacts the health of the community and drives how strategies to improve community health are structured. This course prepares students to demonstrate leadership as a DNP to take an active role in health advocacy and health policy development. Issues such as social justice,
access to health care, health care financing, and nurses in the political arena will be explored.

NURS608 Epidemiology and Population Health (3 Credit Hours): PREREQUISITE NURS632. This course prepares DNP students to relate the science of epidemiology, including genetic and environmental epidemiology, to evidence-based nursing practice in providing care to populations. Course content will cover identifying and defining population outcomes, concepts of epidemiology used in population-based research, and using data and information technology to target at-risk populations to improve health outcomes.

NURS620 Legal and Ethical Issues (3 Credit Hours): This course provides a foundation for values, codes and principles governing decisions in advanced nursing practice, conduct and relationships. The format of the course is to use a case analysis and introduce a broad range of clinical ethical issues and to present the theoretical and practical knowledge that enables practitioners to provide leadership in responding to the ethical challenges confronting the health care system today. There is specific emphasis on legal concepts, the judicial process, ethical decision making, and exploring interdisciplinary collaboration to strengthen ethical dialogue and decision making.

NURS632 Biostatistics for the DNP (3 Credit Hours): This course is designed to broaden and enrich the DNP student’s knowledge and understanding of biostatistics to facilitate implementation of evidence-based care to populations. The course includes descriptive and inferential statistical analyses applicable to the health of populations. Multivariate methodologies will be applied in the analysis of population trends and outcomes. Additional skills include use of statistical software for analysis and interpretation of statistical tests.

NURS637 Program Development and Grant Writing (3 Credit Hours): PREREQUISITE NURS608. Program development is an ongoing systematic process for the planning, funding, implementation and evaluation of programs. Content will cover principles and models for program planning, grant writing, and formative and summative outcomes measurement. In addition, students will gain practical skills in project management, program delivery and marketing. Students will acquire content knowledge, writing proficiency, research skills, organizational ability, and principles of persuasion. This course will provide students with the background necessary to develop competitive funding proposals and achieve success in health, social, and behavioral programs in a variety of settings.

NURS710 Evidence-Based Practice for the DNP (3 Credit Hours): This doctoral level course focuses on providing the resources for students to evaluate, translate, and integrate published research results into clinical practice. Building on previous course work, students will continue to identify clinical practice problems, develop answerable clinical research questions, search for best evidence, and appraise evidence using epidemiological, biostatistical, and scientific principles. In addition, students will integrate best evidence while taking in to account patient values and preferences. Evaluating the effectiveness of evidence on outcomes is included.

NURS711 Organizational Behavior and Systems Leadership (3 Credit Hours): Organizational and systems leadership skills critical for culturally sensitive nursing practice to improve healthcare and outcomes are enhanced. Focus is on transformational leadership, measurement of outcomes, data driven decision-making, and the business realities of leading within healthcare. The emphasis is on skills and competencies needed to provide a scientific knowledge base for DNP leadership in quality healthcare and systems of change focusing on not only the outcome, but safety, fiscal principles, efficiency and quality.

NURS713 Advancements in Information, Quality and Safety (3 Credit Hours): This course emphasizes the leadership and development of nursing science in the fields of informatics, quality and safety for the transformation of healthcare and promotion of population health outcomes. Through the perspective of collaborative, inter-professional initiatives, health information systems, policies and practices are designed, reviewed, analyzed, and revised for the implementation of emerging technologies and the continuous promotion of quality in patient-centered care and population health outcomes. Analytical methods are integrated into the designing, implementing, and evaluating of effective evidence-based practice and continuous quality and safety improvement needed in health care.

NURS722 DNP Project I (3 Credit Hours): PREREQUISITE NURS710. This course is the first of three sequential clinical courses that focuses on the DNP project development providing experiential learning opportunities for the student. The course challenges the student to finalize their DNP project proposal building upon the foundation of clinical, behavioral and social sciences. Students will have the opportunity to collaborate with doctoral faculty and mentor experts to refine and develop their project proposal including submission of the final project proposal paper, IRB application and project implementation once approved by the IRB. The student meets a minimum of 150 clinical hours.

NURS723 DNP Project II (3 Credit Hours): PREREQUISITE NURS722. This course is the second of three sequential clinical courses with a focus on the implementation of the DNP project developed in NURS 722 providing experiential learning opportunities for the student. As the approved project progresses the student continues with the opportunity to collaborate with doctoral faculty and mentor experts to collect and analyze data to evaluate the scholarly project's outcomes. Throughout the three sequential clinical courses, the DNP student will employ expanded advanced practice nursing role competencies focusing on their populations of interest. The student meets a minimum of 150 clinical hours.
NURS725 DNP Project III (4 Credit Hours): PRE-REQUISITE NURS723. This course is the third of three sequential clinical courses with a continued focus on the completion of the DNP project developed in the previous two clinical courses providing experiential learning opportunities for the student. As the project progresses the student continues with the opportunity to collaborate with doctoral faculty and mentor experts to analyze data and formulate the final project outcome(s). The student will be required to disseminate the project findings. The sequential clinical courses provide students with experiential learning competencies for future scholarship. The student meets a minimum of 225 clinical hours.
The Center for Bioethics and Humanities advances the scholarly and professional understanding of bioethics and the medical humanities. Ultimately, our goal is to promote health care and health policy that is patient centered, compassionate, and just. All students complete required coursework in bioethics during their time at SUNY Upstate. Center faculty members teach required and elective courses in the Colleges of Graduate Studies, Health Professions, Medicine, and Nursing. We also provide educational programs throughout the University, including clinical case discussions, departmental Grand Rounds, special seminars and symposia.

**Required Courses and Descriptions for College of Graduate Studies**

**GS618  Responsible Conduct of Scientific Research** (Research Ethics) I (1 Credit Hour): Biomedical scientific research is a complex undertaking, with a theoretical framework for how scientific progress should be made, professional norms about acceptable scientific conduct, and an ever-expanding array of ethical challenges following on the heels of technical advances. The complexity and rapid advance of biomedical research, as well as numerous instances of deception, conflicts of interest, and inappropriate care of animals or humans involved in research, suggest that merely having good intentions is not always sufficient. This required course, using a case-based format, short didactic presentations, and in-class exercises, helps graduate students: improve their moral reasoning skills in the context of scientific research; deepen their understanding of the professional norms of science; and gain an understanding of the regulatory framework and ethical principles governing biomedical research. Course topics include an introduction to scientific and moral reasoning, the regulatory framework governing science, and discussions of the pressures of science, authorship, plagiarism, peer review, collaborative research, mentoring, and data ownership/management and intellectual property.

**GS619  Responsible Conduct of Scientific Research** (Research Ethics) II (1 Credit Hour): This course builds on GS618 Responsible Conduct of Scientific Research (Research Ethics) I, briefly revisiting core topics in the responsible conduct of scientific research, and then covering additional topics, including: conflicts of interest, the regulatory frameworks governing the use of humans and animals in research (including an international perspective), and ethical issues in genetics and stem cell research. Unlike the lecture-based format of Research Ethics I, given the students’ additional experience and lab assignments, this course will utilize a case-based format, short didactic presentations, and in-class exercises, endeavors to help graduate students: hone their moral reasoning skills in the context of scientific research; and apply their understanding of the professional norms of science to cases.

For a listing of electives visit: [http://www.upstate.edu/bioethics/education/ed_othergrad.php](http://www.upstate.edu/bioethics/education/ed_othergrad.php)

**Required Courses and Descriptions for College of Health Professions**

**CBHX320/520  Health Care Ethics** (3 Credit Hours): The course applies ethical theories and principles to contemporary health care dilemmas. Students learn how ethical principles - such as autonomy, confidentiality, truth-telling, justice, beneficence, nonmaleficence, and informed consent - can be used to resolve particular ethical issues and specific cases, such as end of life, the allocation of health care, privacy, reproductive rights, testing and screening, biomedical research, and professional conduct. The course emphasizes critical thinking, case-based analysis, ethical decision making and problem solving.


**Required Courses and Descriptions for College of Medicine**

**MOM201  The Practice of Medicine 2**: Students will continue to further master medical interviewing, physical examination and medical communications skills. Students will explore how to synthesize data gathering information into a plausible explanation of the patient’s health status. Students will learn patterns of disease and syndromes by utilizing the small group setting, engaging in clinical experiences and various special sessions. Evidence Based Medicine (EBM) is a component of this course.

**CBHX2400  Clinical Bioethics and Communication Clerkship** (1 Credit Hour): In this longitudinal concurrent case-based course which spans the third year, students meet in small groups with a faculty tutor to discuss ethical issues presented in patient care. Students bring their own cases for discussion, and faculty provide other cases to provide the opportunity to discuss and learn about ethical principles and a method of case analysis for ethical concerns raised in patient care. Advanced communication skills are addressed in this course.

Required Courses and Descriptions for College of Nursing

CBHX320/520 Health Care Ethics (3 Credit Hours): The course applies ethical theories and principles to contemporary health care dilemmas. Students learn how ethical principles - such as autonomy, confidentiality, truth-telling, justice, beneficence, nonmaleficence, and informed consent - can be used to resolve particular ethical issues and specific cases, such as end of life, the allocation of health care, privacy, reproductive rights, testing and screening, biomedical research, and professional conduct. The course emphasizes critical thinking, case-based analysis, ethical decision-making and problem solving.

For a listing of electives visit:
http://www.upstate.edu/bioethics/education/ed_con.php

Consortium for Culture and Medicine

The Consortium for Culture and Medicine is a cooperative program among LeMoyne College, Syracuse University and Upstate. It is administered by co-directors from each institution, with a committee of College and University administrators from the participating schools.

For a listing of courses visit:
http://www.upstate.edu/ccm/descriptions.php