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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 specific 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/

Electives for the College of Graduate Studies:
http://www.upstate.edu/grad/apps/course_sel.pdf

Electives for the College of Health Professions:
http://www.upstate.edu/chp/

Electives for the College of Medicine:

Electives for the College of Nursing:
http://www.upstate.edu/con/

Policies and procedures – Student Handbook:
The State University of New York (SUNY) Upstate Medical University encompasses the College of Graduate Studies Medicine, College of Health Professions, College of Medicine, College of Nursing, the Binghamton campus 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 nation’s first woman physician.

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 branch campus 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, which will be the region’s only comprehensive outpatient resource for the treatment of cancer and blood disorders for adults and children, opens in summer 2014. A new Academic Building will be completed in summer 2015, and will provide administrative and classroom space for the Colleges of Health Professions and Nursing.
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 to be the leading regional academic medical center in the nation. In achieving this vision, SUNY Upstate will be:

- A highly-regarded resource for the education of health professionals, especially in shortage areas;
- A global resource for research that improves understanding of health and disease;
- A catalyst in the delivery of patient-centered health care that addresses our region’s most pressing concerns;
- A place to work that recognizes excellence.

**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 (CAAAEP)
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

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 Assistant Vice President, Office of Diversity and Inclusion, (Maxine Thompson), 711 Jacobsen Hall, Upstate Medical University; Telephone: (315) 464-5232; Email: Thompsms@upstate.edu.

Inquiries may also be directed to the United States Department of Education’s Office for Civil Rights, 32 Old Slip 26th Floor, New York, NY 10005-2500; Tel. (646)-428-3800; Email: OCR.NewYork@ed.gov.
## 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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</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
College of Graduate Studies

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

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 basic biomedical sciences and to develop a sense of community and collegiality. 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; Introduction to Applied Biostatistics and Research Design, introducing the basic principles of biostatistic and experimental design for research in the biomedical sciences; 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 of their second year. 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 thesis 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. After completing their research projects, students write a thesis and defend it before a dissertation defense committee.

Master’s Degree

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 dissertation, 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 degree granting program and the advisor.

MD/PhD Program

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 auspices 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 waivers are provided for all students during all years of 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 (see above).

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 Coordinator, the Dean of College of Graduate Studies, and the MD/PhD Program Co-directors. The courses transferred are those that fulfill the COGS core curriculum and typically ones that correlate with the degree-granting program you choose.

The MD/PhD Grand Rounds course is taken for potential College of Medicine Elective Credit during the length of the MD/PhD Program. The total time spent in the program should be no more than eight years.

Prior to graduation from the program each student must have at least one accepted first-author publication of experimental data from their thesis work in a peer-reviewed journal. After successful defense of the dissertation, MD/PhD students complete the last two years of medical school.

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 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. 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.

GS617 Introduction to Applied Biostatistics and Research Design (2 Credit Hours): This course introduces the basic principles of biostatics and experiment design for research in the biomedical sciences. Emphasis will be placed on application and interpretation of biostatistical methods and necessary student calculations. Knowledge of statistical assumptions underlying the methods, and techniques for assessing violation of these assumptions will be stressed. A concept-focused approach will be used to teach the statistical content, which includes descriptive statistics, probability distributions, point and interval estimation of population parameters, and hypothesis testing.

GS637 Responsible Conduct of Scientific Research (Research Ethics) (2 Credit Hours): This one semester course will utilize a case-based format, short didactic presentations, and student in-class presentations to help 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.

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 development. 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 department boasts a robust and long-standing record of extramural funding, particularly from the National Institutes of Health.

Ph.D. Degree Requirements

Required Graduate Courses:
- GS616 Foundations of Molecular and Cellular Biology
- GS617 Intro to Applied Biostatics and Research Design
- 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 is considered an advanced Biochemistry & Molecular Biology course 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

M.S. 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 Thesis 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.

B638 Independent Study in Biochemistry and Molecular Biology (1 – 3 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): Directed reading and student directed presentations on the primary literature that relates to gene expression from transcription to nuclear export.
B648  Research Design in Biochemistry & Molecular Biology (3 Credit Hours): This course promotes the development of critical thinking, experimental design, 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 microscopy, 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.

**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. 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.

**Ph.D. 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
- GS617 Introduction to Applied Biostatistics and Research Design
- 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
- B649 Topics in Quantitative Biology
- 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
30 min Departmental Seminar (to be presented within 6 mos. of qualifying exam)

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
GS617 Intro to Applied Biostatistics & Research Design
GS628 Systems Bio of Genetics, Genomics Proteomics
GS892 Introduction to the Presentation and Analysis of Scientific Literature: Journal Club
A505 Gross Anatomy
A507 Introduction to Neuroscience
A613 Graduate Cellular Anatomy
A614 Contemporary Cellular, Molecular, and Developmental Biology
A621 Neuroanatomy Lab
A622 Developmental Biology
B649 Topics in Quantitative Biology
B664 Protein Sorting and Vesicular Trafficking
B666 Protein Structure Determination
N620 Advanced Topics in Receptors and Cell Signaling
N623 Systems Neuroscience
PH615 Apoptosis and Cancer Pharmacology
PH621 Cancer Biology and Therapeutics

Total Didactic Graduate (minimum of 20 credit hours):

Department Seminar Series

Thesis Committee Meetings (minimum of one meeting per year)

Successful Thesis Defense

**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.

A614 Contemporary Cellular, Molecular and Developmental Biology (3 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, 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:
• Ph.D 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 and parasites, the host response to infection, and the development and function of the immune system. A range of viruses are studied, including dengue virus, Epstein-Barr virus (EBV), Kaposi’s sarcoma-associated herpes virus (KSHV), cytomegalovirus, herpes simplex virus and varicella zoster virus. The focus of virology research is on pathogenesis, gene regulation, molecular interactions between the virus and host cell, antiviral agents, and viral replication as well as cancers caused EBV and KSHV. Research on malaria and toxoplasma is also conducted. Immunology research focuses on autoimmune diseases, macrophage function, T cell development, antigen processing and presentation, viral immunity, immunotoxicology and vaccine development. A central theme is understanding how the immune system prevents or causes diseases. Research is conducted at the molecular, biochemical, genetic and population levels with goals of developing vaccines and therapeutics of infectious diseases.

Ph.D. 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
GS617 Introduction to Applied Biostatistics and Research Design
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

Each student will assist in the Medical Microbiology laboratory courses (second, third, and possibly fourth, not the final thesis year).

* 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 Immuno. Research
Elective: M609 Grant Writing in Microbiology and Immunology
Elective: Introduction to Applied Biostatistics and Research Design

*Either M616 or M610 is required.

Successful Thesis Defense

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 fourteen 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.

Ph.D. 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)
- GS617 Introduction to Applied Biostatistics and Research Design (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)
- N629 Scientific Writing in Neuroscience (Fall, yr. 2)
- N627 Grant Writing in Neuroscience (Spring, yr. 2)

**Electives**

- N631 Topics in Neuroscience (only open to 1st year students; Fall; Weeks 8-14)
- 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)
- N623 Systems Neuroscience
- 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
- 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 (2 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 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, leukemia, drug discovery, structure-based drug design, cell signaling, cardiovascular disease, neurodegeneration and stem cells.

The department's strengths include cardiac electrophysiology and cardiac arrhythmias; the molecular biology of signaling pathways, intracellular proteolysis, cancer biology, regulation of tumor suppressors and the discovery, development and testing of novel cancer 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.

Ph.D. Requirements

Required Graduate Courses:
- GS616 Foundations of Molecular and Cellular Biology
- GS617 Introduction to Applied Biostatistics and Research Design
- 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
- PHA619 Autonomic Pharmacology*
- PHA540 Medical 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) or PHA540.

Total Didactic Graduate Courses (min 30 credit 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
- GS617 Introduction to Applied Biostatistics and Research Design
- GS637 Responsible conduct of Science Research (Research Ethics)
- GS892 Introduction to the presentation and Analysis of Scientific Literature: Journal Club
- PHA645 Pharmacology Seminar (one per academic year)
- PHA610 Principles of Pharmacology Elective Advanced Pharmacology Courses:
- PHA617 Methods of Pharmacology Research
- PHA612 Cardiovascular Physiology and Pharmacology
- PHA602 Cell Physiology of Excitable cells
- PHA615 Apoptosis and Cancer Pharmacology
- PHA619 Autonomic Pharmacology
- PHA622 Principles and Practices of Drug Discovery and Development
- PHA623 Grant Writing
- PHA540 Medical Pharmacology

All M.S. students are required to take minimum of 4 advanced Pharmacology Course credits (including PHA610). Students may choose to take Medical Pharmacology (PHA540) to fulfill this requirement. 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
Course Descriptions

PHA540 Pharmacology (7 Credit Hours): This course emphasizes the basic principles of drug action as related to modern therapeutics. The course is organized in six units based upon organ systems and aligned with similar subject matter taught in other second year courses in the medical student curriculum. Each unit includes relevant lectures, an online problem solving session, and a clinical case presentation. The role of the faculty is to support students in learning pharmacology and in gaining a foundation upon which to build a rational approach to the use of drugs in clinical practice.

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, co-operativity 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 (540PHA). 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 detail and analyze current knowledge in cardiovascular anatomy, physiology, and pharmacology. Topics covered will be the molecular, cellular and electrophysiological bases of cardiovascular function, and the cellular and molecular mechanisms of drugs used to treat hypertension, myocardial ischemia, heart failure and complex cardiac arrhythmias. This course is designed as a self-study with weekly moderated discussion sessions to monitor progress. A minimum of two students must register for this course to be offered.

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 acuity mentor prior to enrollment in the class.

PHA619 Autonomic Pharmacology (1 Credit Hour): This course covers the essential features of the autonomic nervous system in humans, and drugs and toxic agents that modify this system. The course will be composed of a combination of graduate student-specific lectures and tutorials together with selected lectures from Medical School.

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 literature 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.

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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.

Ph.D. Requirements

Core Curriculum

First Year

- GS604 Graduate Student Research Opportunities
- GS612 Biomedical Sciences Laboratory Rotations (1st Rotation)
- GS616 Foundations of Molecular and Cellular Biology
- GS617 Introduction to Applied Biostatistics and Research Design
- 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

Second Year

- GS637 Responsible Conduct of Scientific Research (Research Ethics)

In addition, students must take additional advanced electives

Required Physiology Courses:

- PHY657 Systems Physiology
- PHY659 Physiology Seminar
- PHY627 Grant Writing Course in Neuroscience & Physiology

Specialty courses and biostatistics selected to support and enrich the student’s research area.

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

M.S. 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)

Additional courses determined by degree granting program and Advisor.

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 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. It is anticipated that the finalized application will be submitted to the NIH for funding consideration.
PHY652  Journal Club in Physiology (1 Credit Hour): This course is designed to be taken concurrently with Systems Physiology, although it could also be taken one year later. It consists of six sessions, each lasting approximately two hours. Students will present and discuss assigned journal articles dealing with topics currently being discussed in the lecture course in Systems Physiology. Sessions will cover cardiovascular physiology (2), respiratory physiology (1), renal physiology (1), gastrointestinal physiology (1) and endocrine physiology (1).

PHY657  Systems Physiology (6 Credit Hours): This is a course consisting of about 70 lectures (plus demonstrations and laboratories) contained in the medical college course Mammalian Physiology. The lectures cover material in cardiovascular, respiratory, renal, gastrointestinal and endocrine physiology. Exams follow each of the units.

PHY658  Directed Individual Study in Physiological Research Methods (Variable Credit): This is a special research training program designed to acquaint students with specific areas of research and/or the use of methods, techniques and instrumentation.

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 with 4 exams.

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.

OBS610  Orthopedic Basic Science (1 Credit Hour/Semester): This course is intended to provide a broad overview of basic musculoskeletal science for graduate studies. This course covers, in broad perspective, the basic principles that underlie the function of the elements of the musculoskeletal system including their form and function, growth and development, injury and repair.

MD/PhD Courses:
The courses below are unique to the MD/PhD program.

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.
College of Health Professions

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.

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

COMM 301 Media and Interpersonal Communication (3 Credit Hours): One section of this course will focus on how the healthcare field is portrayed through the media and analyze the differences among its various mediums. The other section of the course will focus on interpersonal communication and its purpose, uses, and execution. Students will have the opportunity to analyze healthcare professional/patient relationships and determine how to make them better in given situations.

Education

EDUC340 Educational Psychology (3 Credit Hours): The study of psychological principles and research is applied to learning, teaching, and changing attitudes, emotions, and behavior.

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.

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.

ENGL 631 Examining Mental Illness in Shakespeare’s Tragedies (2 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.

**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.

**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): 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, non-maleficence, 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.

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, non-maleficence, 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_chp.php

**Cardiovascular Perfusion: Bachelor of Science Degree Program**

CIP Code: 51.0906
http://www.upstate.edu/chp/programs/cp/index.php

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**

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOL 340 Advanced Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 441 Research Methods I - SUNY Gen Ed Course</td>
<td>3</td>
</tr>
<tr>
<td>CVPR 305 Perfusion Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 310 Clinical Perfusion</td>
<td>4</td>
</tr>
<tr>
<td>CVPR 316 Cardiovascular Perfusion Techniques I</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 322 Physiologic Assessment</td>
<td>2</td>
</tr>
<tr>
<td>PATH 360 Pathology</td>
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<td><strong>TOTAL</strong></td>
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<tr>
<th>Spring Semester</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CBHX 315 Health Care Ethics**</td>
<td>2</td>
</tr>
<tr>
<td>CCFM 402 Ethics and the Health Professions **</td>
<td>(3)</td>
</tr>
<tr>
<td>CVPR 312 Cardiac Pathophysiology</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 325 Diagnostic Procedures</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 326 Pediatric Perfusion</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 328 Perfusion Critique</td>
<td>1</td>
</tr>
<tr>
<td>CVPR 330 Blood, Coagulation and Hemostasis</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 345 Perfusion Laboratory II</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 350 Clinical Perfusion II</td>
<td>4</td>
</tr>
<tr>
<td>ENGL302 Foundations of Professional Communication</td>
<td>0.5</td>
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<td><strong>TOTAL</strong></td>
<td><strong>17.5</strong></td>
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<table>
<thead>
<tr>
<th>Summer Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVPR 360 Extracorporeal Life Support</td>
<td>3</td>
</tr>
<tr>
<td>CVPR 371 Cardiovascular Perfusion Techniques II</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 385 Perfusion Laboratory III</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 390 Clinical Perfusion III</td>
<td>2</td>
</tr>
<tr>
<td>CVPR 395 Summer Clinical Perfusion *</td>
<td>(7)</td>
</tr>
<tr>
<td>CVPR 374 Perfusion Research *</td>
<td>(7)</td>
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<td><strong>TOTAL</strong></td>
<td><strong>16</strong></td>
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**Senior Year**

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
</table>

21
ENGL303 Foundations of Professional Communication 0.5
PHRM301 Pharmacology 2
CVPR 410 Clinical Perfusion IV 11
CVPR 414 Cardiovascular Perfusion Seminar 4
TOTAL 17.5

Spring Semester Credit Hours
CVPR 450 Advanced Clinical Perfusion 15
TOTAL 15

* Either of these courses may be taken to fulfill the 7 credit hour Selected Elective
** Either of these courses may be taken to fulfill the 3 credit hour Ethics Elective

Course Descriptions

CVPR305 Perfusion Laboratory I (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 first semester courses while evaluating the students’ development of clinical skills which will be required in the clinical environment.

CVPR310 Clinical Perfusion I (4 Credit Hours): This course provides the student with clinical practice in application of material learned in the other fall courses. The initial focus is on patient review, assembly, priming and recirculation of the various cardiopulmonary bypass systems in use for different types of procedures under direct supervision. 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 venricular 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. Video conferencing 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.

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). A three-year (seven semesters) extended program is available. Prerequisite: 60 semester hours in selected subjects

Junior Year
Fall Semester
CHEM 351 Biochemistry Lecture 3
CHEM 352 Biochemistry Lab 1
MATH 301 Laboratory Statistics 1.5
PATH 360 Pathology 3
MEDT 350 Human Genetics 3
MEDT 351 Hematology 4
MEDT 308 Seminar in Biotechnology 1
TOTAL 16.5

Spring Semester
MEDT 303 Immunology 3.5
MEDT 360 Chemistry 5
CBHX 315 Health Care Ethics 2
BIOL 379 Cell & Molecular Biology 3
ENGL 325 Professional And Technical Writing 3
TOTAL 16.5

Summer Semester
MEDT 422 Medical Microbiology 6
TOTAL 6

Senior Year
Fall Semester
MEDT 439 Applied Techniques in Medical Biotech 2
BIOL 451 Research Methods I 1
MEDT 454 Introduction to Molecular Methods 2
MEDT 441 Clinical Correlations I 1
MEDT 434 Applied Statistics 1
MEDT 460 Biotechnology Internship I 8
TOTAL 15

Spring Semester
MEDT 419 Research Problem 3
MEDT 455 Laboratory Operations 2
MEDT444 Principles of Molecular Biology 1
MEDT 522 Advanced Microbiology & Immunology 2
MEDT 461 Biotechnology Internship II 9
TOTAL 17

Total SUNY Upstate Medical University Program Credits: 72

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 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.

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 Credit Hour): 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).

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.

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.

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 application 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 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.

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.

MEDT507 Infectious Disease/Infection Control Clinical (2 Credit hours): Current practices in infection control paired with the diagnosis and evaluation of infectious diseases will be delivered in a clinical experience format. Lectures and individualized instruction may be provided to correlate principles of clinical microbiology with the current laboratory techniques and practices used to detect and identify causes of infectious diseases.

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.

Junior Year

Fall Semester
IMAG300 Imaging Practicum I 1
IMAG301 Positioning Principles I 2
IMAG302 Positioning Laboratory I 2.5
IMAG311 Fundamentals of Imaging and Physics 5
IMAG312 Evaluating Radiographs I 1
RDSC326 Radiologic Science Patient Care 3
IMAG 328 Introduction to Imaging Modalities 1
TOTAL 15.5

Spring Semester
ENGL302 Foundations of Professional Communication 0.5
CBHX320 Health Care Ethics 3
IMAG303 Imaging Practicum II 4
IMAG304 Positioning Principles II 2
IMAG305 Positioning Laboratory II 2
IMAG313 Evaluating Radiographs II 0.5
RDSC 324 Radiation Biology & Protection 2
TOTAL 14.0

Summer Semester
IMAG306 Imaging Practicum III 10
IMAG329 Radiographic/Topographic/Sectional Anatomy 2
IMAG308 Positioning Principles III 1
IMAG314 Evaluating Radiographs III 0.5
IMAG315 Positioning Laboratory III 1
TOTAL 15.5

Senior Year

Fall Semester
BIOL451 Research Methods I - SUNY Gen Ed Course 1
ENGL325 Professional And Technical Writing 3
IMAG415 Imaging Clerkship I 6
PATH360 Pathology 3
TOTAL 13

Spring Semester
IMAG410 Quality Management In Medical Imaging 3
IMAG411 Imaging Pathology 3
IMAG412 Management Practices In MIS 3
IMAG416 Imaging Clerkship II 7
TOTAL 16
## Computed Tomography (CT) Track, BS

### Junior Year

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<td>IMAG301 Positioning Principles I</td>
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<td></td>
<td>IMAG311 Fundamentals of Imaging and Physics</td>
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<td>IMAG312 Evaluating Radiographs</td>
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<td>RDSC326 Radiologic Science Patient Care</td>
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<td>RDSC324 Radiation Biology &amp; Protection</td>
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## Diagnostic Medical Sonography (Ultrasound), BS

### Junior Year

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## Magnetic Resonance (MR) Track, BS

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<td>IMAG301 Positioning Principles I</td>
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<td>IMAG311 Fundamentals of Imaging and Physics</td>
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<td>RDSC326 Radiologic Science Patient Care</td>
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<td><strong>Spring Semester</strong></td>
<td>CBHX320 Health Care Ethics</td>
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<td>IMAG462 Ultrasound Physics &amp; Instrumentation II</td>
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<td>IMAG475 Obstetrics and Gynecology Ultrasound I</td>
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<td>IMAG480 Clinical Practicum I</td>
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<td>Program of Study for Bachelor of Professional Studies (BPS)</td>
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<td>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.</td>
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### Computed Tomography (CT) Track, BPS

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<tr>
<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>PATH360 Pathology</td>
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<tr>
<td>IMAG329 Radiographic, Topographic and Sectional Anatomy</td>
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<tr>
<td>CBHX320 Health Care Ethics</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>IMAG434 Advanced Imaging Practicum III - CT</td>
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<td>IMAG471 Cont. Issues in Medical Imaging</td>
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### Magnetic Resonance (MR) Track, BPS

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<tbody>
<tr>
<td>BIOL451 Research Methods I - SUNY Gen Ed Course</td>
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<tr>
<td>ENGL325 Professional And Technical Writing</td>
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<td>IMAG451 Advanced Imaging Procedures I-MR</td>
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<td>PATH360 Pathology</td>
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<td>IMAG329 Radiographic, Topographic and Sectional Anatomy</td>
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<tr>
<td>CBHX320 Health Care Ethics</td>
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<td>IMAG411 Imaging Pathology</td>
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<td>IMAG454 Advanced Imaging Procedures II - MR</td>
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<tr>
<td>IMAG457 Advanced Imaging Practicum III MR</td>
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### Ultrasound Track, BPS

#### Junior Year

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<tr>
<td>BIOL340 Advanced Physiology</td>
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<td>IMAG327 Topographic, Sectional &amp; Imaging Anatomy for Diagnostic Medical Sonographers</td>
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<td>IMAG472 Abdominal Ultrasound</td>
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<td>IMAG461 Ultrasound Physics &amp; Instrumentation I</td>
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<tbody>
<tr>
<td>CBHX320 Health Care Ethics</td>
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<td>IMAG462 Ultrasound Physics &amp; Instrumentation II</td>
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<tr>
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<td>IMAG478 Ultrasound of Superficial Structures</td>
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<tr>
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<td>IMAG482 Clinical Practicum III</td>
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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.

IMAG328 Intro to Imaging Modalities (1 Credit Hour): An introduction to various imaging modalities including, Computed Tomography, Magnetic Resonance Imaging, Nuclear Medicine, Sonography, and Interventional Radiology for the Radiography and Sonography student. The basics of physics, equipment and instrumentation, anatomy and commonly ordered exams will be covered in all modalities. Case presentations will discuss the use of multiple imaging modalities in the diagnosis and treatment of disease.

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.

IMAG410 Quality Management Med Image (3 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.

IMAG411 Imaging Pathology (3 Credit Hours): This course examines pathologic conditions that are most commonly demonstrated by radiographic CT, MRI, and U/S 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.

IMAG412 Mgmt. Prac. In MIS (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 computer 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 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. Proc. 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, and clinical applications in MR imaging.

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 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.

IMAG458 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.

**IMAG461 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 (paraanatomy) sonographic images and their presentation.

**IMAG462 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.

**IMAG465 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.

**IMAG471 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.

**IMAG475 OB/GYN I (3 Credit Hours):** Introduction to cross sectional anatomy of the female pelvis & obstetric anatomy. A study of embryology with correlated normal sonographic patterns of the female pelvis & obstetric anatomy. Patient interview & examination techniques, terminology, chart & referral evaluation, diagnostic testing protocols related to specific disease, conditions, physiology including blood flow dynamics, pertinent pathology & pathophysiology, patient care considerations & communication, examination ergonomics, legal/ethical issues specific to obstetric & gynecologic ultrasound procedures are discussed, modeled & role-played.

**IMAG476 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. 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.

**IMAG477 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 procedures and pertinent patient care procedures. Vascular imaging is introduced with various applications for associated anatomy.

**IMAG478 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. Sonographic findings for various pathological and physiological conditions associated with superficial structures will be correlated with other medical imaging presentations.

**IMAG480 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 afore mentioned 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.

IMAG 329: 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.

RDS324 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.

RDS326 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 Technician. 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). A three-year (seven semesters) extended program is available.

Prerequisite: 60 semester hours in selected subjects

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<td>CHEM352 Biochemistry Lab</td>
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<td>MEDT309 Seminar In Medical Technology</td>
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<td>MEDT350 Human Genetics</td>
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<td>ENGL325 Professional And Technical Writing</td>
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<td>MEDT325 Urinalysis and Body Fluids</td>
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<td>MEDT401 Clinical Practice Preparation (F)</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 & 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  
- MT636 Laboratory Instrumentation 2  
- MT626 Laboratory Statistics, Quality Control & Assurance 2

Medical Scholars Program MS Degree

Fall Semester

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

Spring Semester

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

Extended Fall

- MEDT501 Biomedical Laboratory Operations 2  
- MEDT502 Medical Microbiology 6

Spring Semester

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

TOTAL CREDITS: 42

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 immunoochemical 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.

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 postanalytical 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.

MT544 Hematology Conference & 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.

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.)

MEDT644 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, leukemic 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.

**First Year**

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<tr>
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<tr>
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<td>DPAS 603 Population Medicine</td>
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<td><strong>Session III:</strong></td>
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<td>DPAS 621 Human Physiology I</td>
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Course Descriptions

DPAS601  Professional Issues I (1 Credit Hour): 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.

DPAS602  Professional Issues II (1 Credit Hour): This course, a continuation of Professional Issues I, 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.

DPAS603  Population Medicine (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.

DPAS604  Interviewing & Documentation (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.

DPAS605  Human Anatomy (9 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.

DPAS606  Physical Diagnosis (2 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.

DPAS607  Advanced Physical Diagnosis (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.

DPAS608  EKG Interpretation (1 Credit Hour): This course reviews the basic principles of electrocardiography, as well as the interpretation of the 12 lead EKG including rate, rhythm, blocks, axis, hypertrophy, injury, and infarction.

DPAS611  General Medicine I (5 Credit Hours): This is the first course of a three course sequence. This course covers the etiology, pathophysiology, signs, symptoms, differential diagnosis, laboratory and imaging studies, and treatment for a wide variety of diseases, syndromes, and disorders. Systems and topics covered are sequenced Physiology I and Pharmacology I.

DPAS612  General Medicine II (5 Credit Hours): This course is a continuation of General Medicine I. Systems are sequenced with organ systems in Physiology II and drug classes in Pharmacology II.
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. 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 (4 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 (4 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 develop 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

The Professional Doctoral Program is a full-time professional preparation program in physical therapy. Graduates of this program receive a Doctor of Physical Therapy Degree and are eligible to apply for licensure as physical therapists throughout the United States.

First Year

Fall Semester

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<td>PHYT602 Professional Behaviors</td>
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Fall Session

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<td>PHYT611 Bioscience I</td>
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<tr>
<td>PHYT615 Intro to Manual Therapy &amp; Exercise</td>
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<tr>
<td>PHYT621 Foundations of Patient/Client Management I</td>
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<td>PHYT625 Movement Analysis &amp; Patient/Client Management II</td>
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<td>PHYT642 Research Methods</td>
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Spring Semester

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<td>PHYT604 Differential Diagnosis in Physical Therapy</td>
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<tr>
<td>PHYT605 Neuroscience</td>
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<td>PHYT612 Bioscience II</td>
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<td>PHYT616 Physical Agents</td>
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<td>PHYT626 Movement Analysis &amp; Patient/Client Management II</td>
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Second Year

Fall Semester

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<td>PHYT631 Patient/Client Management: Adult Neurological Disorders</td>
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<td>PHYT632 Patient/Client Management: The Spine</td>
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<td>PHYT644 Physiology of Exercise</td>
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Fall Session

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Program of Study for Post-Professional Doctor of Physical Therapy (T-DPT)*
Program Code-Post Professional DPT: 27836

The program is designed for U.S. licensed physical therapists who are graduates of bachelor's and master's degree programs and who want to acquire knowledge that was not part of their original professional entry-level education. The number of credits can vary from 13-25+ dependent on the entry-level degree and a portfolio review. The program is not accepting new students.

Core

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<td>PHYT665 Differential Diagnosis and Imaging, Part I</td>
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<td>PHYT666 Differential Diagnosis and Imaging, Part II</td>
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<td>PHYT682 Evidence-Based Practice and Decision Making</td>
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<td>PHYT689 Evolving Theoretical Foundations of Physical Therapy Practice</td>
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<tr>
<td>PHYT692 Case Analysis Seminar</td>
<td>3</td>
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<tr>
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</table>
Course Descriptions

PHYT601 Gross Anatomy (6 Credit Hours): This course utilizes a regional approach to the study of human anatomy.

PHYT622 Current Issues in Pediatric Physical Therapy
PHYT623 Current Issues in Orthopedic Physical Therapy
PHYT624 Current Issues in Geriatric Physical Therapy
PHYT627 Current Issues in Acute Care Physical Therapy
PHYT628 Current Issues in Physical Therapy Research
PHYT629 Current Issues in Sports Physical Therapy
PHYT656 Management, Leadership and Entrepreneurship Fellowship
PHYT658 Clinical Fellowship
PHYT659 Teaching Practicum
PHYT675 Research Fellowship
PHYT698 Doctoral Continuation Credit

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 PT (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
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 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 Neuro Disorder (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 – Cardio & Pulmonary Disorder (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.

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 cardiorespiratory 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 Pat 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.

PHYT653 Medical Ethics for PT (2 Credit Hours): This course applies ethical theories and principles to moral issues that arise in the profession of physical therapy and in the broader field of health care in society. Selected moral decision-procedures are examined and applied to issues that are commonly encountered in the role of physical therapist in relationship to the day-to-day practice of physical therapy, and the broader role of physical therapy in its relationship to the health care community and society.

PHYT654 Gerontology for PT (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 behavior 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).

PHYT665 Differential Diagnosis & Imaging, Part I (3 Credit Hours): This course will provide the foundations for medical screening and questioning, evaluation of evidence pertaining to diagnosis, pain, and abnormal and normal anatomy as it relates to imaging. Theories and concepts of differential diagnosis of the musculoskeletal system, cardiopulmonary and endocrine systems will be explored through instructor led discussions of the evidence, readings in textbooks, and student/physical therapist experience and actual cases. Skill labs will be utilized to master skills in examination. Imaging studies and principles will supplement the critical reasoning process of differential diagnosis of the musculoskeletal, cardiopulmonary, and endocrine systems.
PHYT692 Case Analysis Seminar (1 to 3 Credit Hours): This course is the capstone project of the DPT degree and is completed over two semesters. The student will write a credible case report that demonstrates critical thinking and sound clinical decision making based on evidence-based practice and relevant theory(ies) in physical therapy. Online support is provided throughout the course.

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 with 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
Fall Semester
BIOL451 Research Methods I - SUNY Gen Ed 1
PATH360 Pathology 3
RADT300 Introduction To Radiation Therapy 2
RADT317 Essentials of Oncology I 4
RDSC323 Radiologic Physics 2
RDSC326 Radiologic Science Patient Care 3
RADT341 Rad. Onc. Imaging 1
TOTAL 16

Spring Semester
ENGL302 Foundations of Professional Communication 0.5
RADT318 Essentials of Oncology II 2
RADT320 Introduction To Clinical Education 3
RADT327 Applied Rad. Onc. Anatomy 2
RADT342 Adv. Rad. Onc. Imaging 2
RADT361 Medical Dosimetry I 3
RDSC324 Radiation Biology & Protection 2
CBHX320 Health Care Ethics 3
TOTAL 17.5

Summer Semester
RADT321 Treatment Application I 4
RADT331 Clinical Simulation I 5
RADT335 Patient Care 1
RADT422 Treatment Application II 4
TOTAL 14

Senior Year
Fall Semester
ENGL303 Foundations of Professional Communication 0.5
RADT423 Treatment Application III 4
RADT432 Clinical Simulation II 4
RADT435 Applied Dosimetry 4
RADT451 Radiation Therapy Seminar I 3
RADT455 Radiation Oncology Management 1
RADT462 Medical Dosimetry II 3
TOTAL 19.5

Spring Semester
RADT365 Radiation Therapy Physics 3
RADT441 Clinical Internship I 6
RADT442 Clinical Internship II 6
RADT452 Radiation Therapy Seminar II 3
RADT470 Senior Project 1
TOTAL 19

* Subject to change.

Program of Study for Bachelor of Professional Studies
For students who have an associate's degree and are registered or registry-eligible medical radiographers.

Junior Year
Fall Semester
BIOL451 Research Methods I - SUNY Gen Ed Course 1
EDUC352 Teaching Methods 3
ENGL325 Professional And Technical Writing 3
PATH360 Pathology 3
RADT300 Introduction To Radiation Therapy 2
RADT317 Essentials of Oncology I 4
RDSC323 Radiologic Physics 2
TOTAL 18

Spring Semester
ENGL302 Foundations of Professional Communication 0.5
RADT318 Essentials of Oncology II 2
RADT320 Introduction To Clinical Education 3
RADT327 Applied Rad. Onc. Anatomy 2
RADT342 Adv. Rad. Onc. Imaging 2
RADT361 Medical Dosimetry I 3
CBHX320 Health Care Ethics 3
RADT365 Radiation Therapy Physics 3
TOTAL 19.5

Summer Semester
RADT321 Treatment Application I 4
RADT331 Clinical Simulation I 5
RADT335 Patient Care 1
RADT422 Treatment Application II 4
TOTAL 14

Senior Year
Fall Semester
ENGL303 Foundations of Professional Communication 0.5
RADT423 Treatment Application III 4
RADT432 Clinical Simulation II 4
RADT435 Applied Dosimetry 4
RADT451 Radiation Therapy Seminar I 3
RADT455 Radiation Oncology Management 1
RADT462 Medical Dosimetry II 3
TOTAL 19

* Subject to change.

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 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.

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.

RADT455 Radiation Oncology Management (1 Credit Hour): This course provides the student with an introduction to economic concepts as they apply to the delivery of care in a modern radiation oncology department. It will provide opportunities for the student to gain a practical understanding of organizational behavior issues, reimbursement methodologies & payment systems, and strategic marketing. Current issues will be examined from a human resource planning & management perspective. Additionally, the student will be introduced to health care economics from a global perspective.

RADT462 Med Dosimetry II (3 Credit Hours): Content is designed, through lecture and laboratory, to establish factors that influence and govern clinical planning of patient treatment. Special procedures and emerging technologies are also presented. Quality management which incorporates all operations and functions of a radiation therapy facility/service is presented.

RADT470 Senior Project (1 Credit Hour): This individual instruction course provides the senior level student with an opportunity to explore a radiation therapy subject areas of interest selected in consultation with a member of the faculty. It is graded via a pass/fail system.

RDSC323 Radiologic Physics (2 Credit Hours): Through discussion and illustrated talk, an introduction to radiation physics with emphasis on the physics and principles utilized in medical imaging. Topics include: basic physics, atomic and nuclear structure, radioactive decay, production of x-rays, interaction of radiation with matter, radiographic technique, and imaging modalities.

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.
course will consist of lecture, demonstration, and laboratory experiences.

Respiratory Therapy: Bachelor of Science Degree
CIP Code: 51.0908
http://www.upstate.edu/chp/programs/csrc/index.php

Respiratory Therapy is an allied health specialty 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, intermittent positive pressure breathing (IPPB), 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 ailments such as cardiac failure, asthma, pulmonary edema, emphysema, 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 apply for licensure as respiratory therapists throughout the United States.

### Junior Year

#### Fall Semester

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<td>RESP304</td>
<td>Clinical Application I: Basic Respiratory Care</td>
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<td>RESP321</td>
<td>Physical Principle of Respiratory Care</td>
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</tr>
<tr>
<td>RESP338</td>
<td>Clinical Lab I</td>
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<td>RESP307</td>
<td>Disease Management I</td>
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<td>RESP313</td>
<td>Cardiopulmonary Physiology I</td>
<td>3</td>
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<td>PATH360</td>
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#### Spring Semester

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<td>RESP324</td>
<td>Ventilatory Support</td>
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<td>RESP340</td>
<td>Clinical Lab II</td>
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<td>RESP305</td>
<td>Clinical Application II: Adult Critical Care I</td>
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<td>RESP308</td>
<td>Disease Management II</td>
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<td>PHRM301</td>
<td>Pharmacology</td>
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<td>CBHX 315</td>
<td>Health Care Ethics</td>
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#### Summer Semester

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<tr>
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<td>Clinical Lab III</td>
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<td>RESP339</td>
<td>Global Teaching for the Respiratory Therapist</td>
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<td>RESP 329</td>
<td>Neonatal Respiratory Care</td>
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<tr>
<td>RESP 306</td>
<td>Clinical Application III: Adult Critical Care 2</td>
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<td>RESP 330</td>
<td>Concepts in Hemodynamics</td>
<td>2</td>
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#### Senior Year

#### Fall Semester

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<tr>
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<td>RESP438</td>
<td>Acid-Base Physiology</td>
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<td>RESP431</td>
<td>Cardiopulmonary Home Care and Rehabilitation</td>
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<td>RESP407</td>
<td>Clinical Application IV: Neonatal/Pediatric Critical Care</td>
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<td>RESP408</td>
<td>Clinical Application V: Adult Critical Care 3</td>
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<td>RESP422</td>
<td>Sleep Disorders, Polysomnography and Sleep Technology I</td>
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<td>ENGL302</td>
<td>Professional Communications</td>
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#### Spring Semester

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>RESP439</td>
<td>Evidence-Based Practice in Respiratory Care</td>
<td>2</td>
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<tr>
<td>RESP436</td>
<td>Leadership and Management</td>
<td>2</td>
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<tr>
<td>RESP423</td>
<td>Sleep Disorders, Polysomnography and Sleep Technology II</td>
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<td>RESP409</td>
<td>Clinical Application VI – Comprehensive Respiratory Care</td>
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### Electives

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<tr>
<td>RESP496</td>
<td>Teaching Independent Study</td>
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<tr>
<td>RESP497</td>
<td>Research Independent Study</td>
<td>1-3</td>
</tr>
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<td>RESP498</td>
<td>Leadership/Management Independent Study</td>
<td>1-3</td>
</tr>
<tr>
<td>RESP446</td>
<td>Patient Care Independent Study</td>
<td>1-3</td>
</tr>
<tr>
<td>RESP450</td>
<td>Clinical Elective (optional)</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 (2 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.

RESP309 Neonatal Respiratory Care (2 Credit Hours): This intermediate 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.

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.

RESP314 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.

RESP328 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.

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
RESP 344 Clinical Lab III (2 Credit Hours): This advanced clinical laboratory course is both a review of knowledge & skills in RESP 338 and 340, and clinical courses RESP 301 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: RESP 338 and 340.

RESP 407 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.

RESP 408 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.

RESP 409: Clinical Application VI: Comprehensive Respiratory Care (7 Credit Hours): This advanced, capstone clinical application course is conducted in selected areas of patient care in selected clinical affiliate hospitals, labs, clinics or physician offices. The student may specialize for a portion of their clinical experience. Students are imbedded in specified clinical rotation locations and directly supervised, mentored and assessed by selected clinical preceptors. Prerequisites: RESP 407 and 408

RESP 422 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.

RESP 423 Sleep Disorders, Polysomnography and Sleep Technology II (2 Credit Hours): 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 preceptor respiratory therapist/sleep technologists and patients.

RESP 431 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.

RESP 436 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.

RESP 438 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.

RESP 439 Evidence-Based Practice Respiratory Care (2 Credit Hours): This capstone course involves 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.

RESP 446 Patient Care Independent Study (1-3 Credit Hours): This clinical application course is conducted in various clinical environments as assigned by the Director of Clinical Education. Experiences serve as an optional, elective, intensification, and remediation of clinical coursework with students working under the direct supervision, guidance, and mentoring of selected clinical preceptors.

RESP 450 Clinical Elective (1-3 Credit Hours): This advanced preceptor-facilitated clinical application course is conducted in various clinical environments. Experiences serve as an optional, elective intensification of clinical coursework under the direct supervision, guidance, and mentoring of selected clinical preceptors.

RESP 496 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.

The Rural Medical Scholars Program (RMSP)

The mission of the RMED program is to identify, recruit and nurture those students interested in future rural practice by offering community based clinical training in small town hospitals and practices across NYS. Interested applicants apply by selecting the Rural Medicine Supplemental option on Upstate’s secondary application. Curriculum Includes:
- FAMP1646: Introduction of Trual Health” in MS1-2 years.
  This discussion/lecture based course hosts guest speakers from across NYS, and provides hands on clinical skills training

52
• FAMP1698: “Immersion Week” the summer before MS2 year. Students offered a stipend to live, train, and serve in a small town community for one week.

• FAMP1650: “RMED” in MS3-4 years. Students complete three required clinical rotations (Family Medicine, Emergency and Surgery), along with electives with board certified physicians in small communities through the region. Students receive hands-on individual training with local attending, and incorporate medical training with community service, practice management, and population health management.

MD/MPh Program

The MD/MPh program is designed for students interested in a career combining medicine and public health. Students in the program obtain a combined degree which provides them with expertise in the distribution and determinants of disease and the skills necessary to reduce disease and disability at the population-based level. Students in this program go on to a wide variety of residencies, including Preventive Medicine, and work in practice-based settings, academic health centers and governmental or nongovernmental agencies addressing population health. The combined degree program is designed to be completed in five years. Incoming MD/MPh students matriculate with the incoming class of medical students and take the first two years of the medical school curriculum. They enroll in the MPH program the summer after second year for one year before returning to medical school to complete their last two years. To complete all MPH degree requirements, students take their Capstone course and one elective in the 4th year of medical school. These courses are also counted as medical school electives. Students who are already enrolled in medical school can apply to the program during their second year and follow the same sequence above.

MD/PhD Program

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 seven-year dual-degree program combines our medical school (College of Medicine) with our graduate school in biomedical sciences (College of Graduate Studies). The curriculum for MD/PhD includes a sequence of two years of medical school, three to four years for completion of the PhD degree, followed by the last two years of medical school curriculum. A full description of the program and requirements is available in the College of Graduate Studies section of this catalog.

Student Research Opportunities

Research is an important aspect of medical education at Upstate Medical University, and the College of Medicine faculty strongly support student participation in research. There are many opportunities for medical students to pursue research interests throughout their four years here and students are encouraged to do so. Summer research opportunities are available between first and second year of the program. Many departments offer research elective courses at both the Syracuse and Binghamton campuses. For information about research elective courses and opportunities please refer to the College of Medicine Course Selection Book.

MD Curriculum Overview*

Required First Year Courses:

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<th>Credit Hours</th>
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<tr>
<td>Foundations of Reasoning in Medicine</td>
<td>5</td>
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<tr>
<td>Molecules, Cells &amp; Microbes</td>
<td>8</td>
</tr>
<tr>
<td>Musculoskeletal, Skin &amp; Blood</td>
<td>5</td>
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<tr>
<td>Nervous System</td>
<td>6</td>
</tr>
<tr>
<td>Circulatory &amp; Respiratory I</td>
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<tr>
<td>Urinary &amp; Respiratory II</td>
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<td>Gastro-Intestinal</td>
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<td>Endocrine/Reproductive</td>
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<td>Human Disease: Pathology and Laboratory Medicine</td>
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<tr>
<td>Pharmacology</td>
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<tr>
<td>Practice of Medicine II</td>
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<tr>
<td>Case-Based Learning: Clinical Reasoning and Pathophysiology</td>
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<td>Behavioral Science</td>
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<td>Family Medicine</td>
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<td>Psychiatry</td>
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<td>Pediatrics</td>
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<td>Neuroscience</td>
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<td>Obstetrics/Gynecology</td>
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<td>Surgery and Surgical Subspecialties</td>
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<td>Emergency Medicine</td>
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<td>Clinical Bioethics</td>
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<td>Population Health for Physicians</td>
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<td><strong>TOTAL YEAR 3</strong></td>
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Required Fourth Year

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<td><strong>TOTAL YEAR 4</strong></td>
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*The curriculum is currently under review. Requirements and course descriptions may change.

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. Show evidence of having taken each of the two components of USMLE Step 2 prior to graduation. This evidence must be available to the Registrar no later than the close of business prior to the graduation date. For the graduating class of 2018 and beyond, all students must PASS Step 2 CS and CK to graduate.
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).

**MD Course Descriptions***

**First Year**

**MMCM102  Molecules, Cells and Microbes (MCM):** Focuses on foundational medical knowledge and its application to disease mechanisms. Successful students will learn foundational Microbiology, Virology, Parasitology, Cell and Molecular Biology, Biochemistry, Genetics, Developmental Biology and Immunology as part of this unit. This material will be enhanced by frequent illustrations of Patient Care application, both within the lectures and in clinically oriented small group courses.

**MMSB101 Musculoskeletal, Skin, Blood:** Students will learn the clinical implications of normal and microscopic anatomy of the extremities, including muscles, bones, neurovascular supply and joint structures. The formation, degradation and function of blood will be discussed with emphasis on the process of maintaining homeostasis. 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 lab work and clinically oriented small groups.

**MNSY101 Nervous System:** This unit will provide students with current scientific knowledge of human nervous system structure and function, as well as to begin developing an understanding how abnormalities in structure/function contribute to disease states. This will include a rudimentary exposure to and appreciation of how nervous system pathology manifests in abnormal clinical and laboratory findings.

**MCIR101 Circulatory, Respiratory I:** 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. We will be folding in clinical, laboratory, radiologic and pathologic data into the basic science is taught through this new curriculum. Large lectures, small group studies and case based sessions will reinforce unit learning objectives and engage the student to develop lifelong learning skills.

**MRR101 Urinary, Respiratory II:** After completion of this unit the student will be able to describe the micro and macro function of the urinary system. The student will demonstrate a strong understanding of the mechanisms of renal biology and physiology, in preparation for year two when pharmacology and renal pathology will be discussed. These foundations will allow the student to successfully interpret clinical scenarios encompassing, but not limited to laboratory studies, radiologic studies and clinical case scenarios.

**MGSI101 Gastrointestinal System:** 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:** 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.

**MPPH102 Foundations of Reasoning in Medicine:** This longitudinal course integrates clinical, ethical, and societal medical reasoning into our curriculum. FRM is an active, case based learning course that will integrate with the new horizontally constructed anatomical units of years 1 and 2, in order to align with content for each individual block. These interactive sessions will be in a small group format to allow
students to model not only the clinical case though process but also Ethics, Law and Social Issues (ELSI) and Population Health, Preventive Medicine (PHPM) components. These additional components help students fulfill their professional responsibilities both to the individual patient and the broader population.

MPOM105 Practice of Medicine I: The Practice of Medicine (POM) course spans the first and second years of medical school. In the first year of the course, students learn to integrate scientific knowledge and clinical content by working closely with clinicians in small groups to develop clinical examination, interview and communication skills essential to quality patient care. Students will also have large group presentations, on-line modular learning and a variety of live clinical experiences with patients. Students will also have the opportunity to develop problem lists, differential diagnoses and learn to efficiently present their patients to their peers and clinicians in their small group sessions all throughout the year.

Second Year

MBSC202 Behavioral Science: This wide ranging course covers a variety of topics that cover the behavioral sciences spectrum. This course utilizes SUNY Upstate Medical University’s goals and objectives for medical student education to provide horizontal integration with other specialties and vertical integration in a spiraling curriculum model through a myriad of teaching modalities. Main topics include: psychosocial development, communication skills and ethical encounters, etiology, diagnosis and treatment of psychiatric disorders.

MICI201 Microbiology: The course provides the essential background to the study of infectious disease. The first section covers the basic features of microbes, antisepsis, antibiotics, and consequences of failures of the immune system. This is followed by an in depth study of the medically-important bacteria, viruses, fungi and parasites. Lectures on each topic are interspersed with discussions that illustrate its clinical significance. Diagnostic methods and treatment options are included, with an emphasis on recent trends in infections and antibiotic resistance. The final examination integrates all of the material.

MPHM201 Pharmacology: The Medical Pharmacology course bridges the transition from preclinical to clinical instruction. The course emphasizes basic pharmacological principles as related to modern therapeutics including the mechanism of action of drugs, clinical indications for drug use and adverse drug events. The course consists of lectures, clinical case presentations and problem solving exercises.

MPOM201 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.

MPPH202 Case-Based Learning: Clinical Reasoning and Pathophysiology: This case-based learning experience runs throughout the second year in parallel with core basic science courses and features independent study of case reports, supplemental commentaries (editorials and topic reviews) and primary research reports followed by large-group class discussion. Case readings represent increasingly complex derangements of organ system function with emphasis on the underlying pathophysiologic mechanisms. Articles selected represent current hypotheses and recent findings related to important and unresolved areas of disease mechanisms and management. A prominent focus of the course is the evidence-based process to evaluate, diagnose and treat patients with common clinical complaints, coordinating with the practice of medicine course.

MPTH201 Human Disease: Pathology and Laboratory Medicine: A combined course of general, anatomical and clinical pathology, with emphasis on basic vocabulary and skills, general principles and analysis of problems of disease. Students develop familiarity with etiology, pathogenesis, evolution and manifestations of disease, laboratory methods in diagnosis and approaches to solving clinical problems. Lectures are organ based and emphasize clinical presentations in pathology.

Third Year

CBHX2400 Clinical Bioethics: 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.

EMED1300 Emergency Medicine Clerkship: This 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.

FAMP1600 Family Medicine Clerkship: 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.

MDCN2000 Medicine Clerkship: 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 patient’s illnesses is developed in conferences and seminars.

NEUR3000 Neuroscience Clerkship: This clerkship integrates neurology and neurosurgery instructions. Students see common and uncommon neurological disorders and obtain concentrated training in taking a neurological history and performing a neurological examination. A core curriculum emphasizes neurologic topics common in general practice. Core topics in ophthalmology are also included.

OBGY3600 Obstetrics/Gynecology Clerkship: 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.

PEDS5600 Pediatric Clerkship: 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.

PYCH6800 Psychiatric Clerkship: In this five-week clerkship, students learn interviewing techniques, refine diagnostic skills, prepare case studies and participate in the treatment programs of the services to which they are assigned. Faculty provide seminars to review psychopathology and treatment methods.

SURG8200 Surgery and Surgical Subspecialties Clerkship: 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 therapies.

Fourth Year

INTD9100 March Into Residency (3 Credit Hours): This required course is designed to provide a transitional experience from medical school to residency prior to graduation. The content will include common medical emergencies, safe and effective prescribing, patient safety, the application of evidence-based medicine to patient care, and procedural skills. Educational activities will include lectures, interactive cased-based sessions, small group discussions, and simulation. Specialty specific lectures are given in the field of student’s particular interest.

*The curriculum is continually reviewed by the Curriculum Committee. Requirements and course descriptions may change.

CNYMPH Program

CIP Code: 51.2207

SUNY Upstate Medical University and Syracuse University, offer a joint graduate degree program—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. Students will receive a joint CNYMPH diploma from SUNY Upstate Medical University and Syracuse University. 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 public health practice and policy.

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)

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. In addition to the core and program-specific courses, students may choose from a menu of elective courses to tailor their degree to a specific area of interest. The MPH degree requires a minimum of 42 credit hours distributed as follows:

15 credits are Core Courses, 3 credits each:
- Principles of Epidemiology
- Principles of Biostatistics
- Principles of Environmental Health
- Social and Behavioral Dimensions of Public Health
- Public Health Administration

56
12 credits are Program-Specific Courses.
- Principles of Biostatistics
- Principles of Environmental Health
- Principles of Epidemiology
- Social and Behavioral Dimensions of Public Health
- Public Health Administration

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.

MPHP605 Public Health Practice (3 Credit Hours): This course is intended to provide an introduction to relevant issues in public health practice. The course is broken into a series of modules with faculty from a range of colleges within Upstate Medical University and Syracuse University expert in the subject area. This course will address the theory behind public health practice, including the history of public health, ethics and public health, public health research methods, health literacy, health disparities and other dimensions of public health including maternal and child health, occupational health, alcohol, drugs and tobacco.

MPHP606 Public Health Policy (3 Credit Hours): The primary objective of this course is to introduce the student to the broad context of public health policy. The student will develop skills in policy development as well as policy analysis. They will learn how policies impact the health of communities. The legal foundation and ethical framework for policy will be explored and distinctions between policy and advocacy will be drawn. Current policy issues revolving around the U.S. health care system, Affordable Care Act, and health disparities will be explored as well as specific “hot”
policy issues such as e-cigarettes, pharmaceutical policies and more.

**MPHP642 Mixed Methods Research in Public Health (3 Credit Hours):** This course combines acquisition and analysis of quantitative (e.g. surveys) and qualitative (e.g. open-ended interviews, focus groups, content analysis) data in a single study, either as distinct steps towards a single research or evaluation goal, or as complementary and parallel processes. Students will learn about inductive and deductive processes, hypothesis formation vs. hypothesis testing, and other topics. Instruction in survey design, quantitative analysis of survey data, qualitative data collection methods and analysis, and presentation of results will be included. Prior coursework in statistics and/or research methods required.

**MPHP656 Health Services/Outcomes Research (3 Credit Hours):** This introductory research methods course examines how social factors, personal behaviors, and health care delivery and financing affect access to care, cost and quality of health, and health status. The main goals of health services and outcomes research are to identify the most effective ways to organize, deliver, and finance high quality care; reduce medical errors; and improve patient safety. This course will provide the student with a broad foundation in research methods and will focus on practical issues such as research design, survey methods, questionnaire development, and measurement.

**MPHP657 Public Health Research Methods (3 Credit Hours):** Students will acquire practical skills to be applied in the planning, execution, analysis, and reporting of findings. Course content includes identifying a study question, determining the appropriate design, selecting an appropriate data source, constructing and deploying a survey, interviewing, managing, analyzing and interpreting data, disseminating the results. Quantitative methodologies are emphasized. Students will develop a survey instrument, develop a research data base, conduct appropriate data analyses, and prepare a report using a peer-reviewed journal format and give an oral presentation of their findings.

**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.
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 bachelors and Masters’ 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, acute, 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. The program 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 AAS 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 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.

<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>NURS325 Professional Writing</td>
<td>3</td>
</tr>
<tr>
<td>NURS 414 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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<tr>
<td><strong>TOTAL</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Year One Spring Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS481 Research in Nursing</td>
<td>3</td>
</tr>
<tr>
<td>NURS387 Health Care Policy &amp; Politics</td>
<td>3</td>
</tr>
<tr>
<td>NURS310 Comprehensive Health Assessment</td>
<td>3</td>
</tr>
<tr>
<td>NURS415 Management in Nursing</td>
<td>3</td>
</tr>
<tr>
<td>Statistics Elective</td>
<td>3</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

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

**COURSE PRE-REQUISITES**

NURS444 — NURS326  
NURS456 — NURS481  
NURS565 — NURS481

**COURSE PRE/CO-REQUISITES**

NURS444 — BIOL420  
NURS481 — ENGL325; Statistics  
NURS584 — 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 may 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 or nursing administration.

**MS Curriculum: Pediatric Nurse Practitioner (PNP)**

This program of study lists the courses required to meet graduation requirements.
<table>
<thead>
<tr>
<th>Year One Fall Semester</th>
<th>Credits</th>
</tr>
</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>NURS611 Clinical Pathophysiology</td>
<td>3</td>
</tr>
<tr>
<td>NURS607 Advanced Health Assessment</td>
<td>3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year One Spring Semester</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>NURS680 Clin Mgmt PNP I</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>14</strong></td>
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<table>
<thead>
<tr>
<th>Year One Summer Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS613 Information, Quality and Safety</td>
<td>3</td>
</tr>
<tr>
<td>NURS700 Thesis *** (Optional)</td>
<td>1-3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3-6</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two Fall Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS626 Leadership for APN</td>
<td>3</td>
</tr>
<tr>
<td>NURS687 Clin Mgmt PNP II</td>
<td>6</td>
</tr>
<tr>
<td>Graduate Elective OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS655 Curriculum and Program Dev ++ OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS665 Educational Eval ++ OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS700 Thesis *** and</td>
<td>1-3</td>
</tr>
<tr>
<td>Graduate Statistics Elective</td>
<td>3</td>
</tr>
<tr>
<td>(500+ or higher)+, ++, +++</td>
<td>3</td>
</tr>
<tr>
<td>Culminating Graduate Project*</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Year Two Spring Semester</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>NURS642 Clin Mgmt/FNP III</td>
<td>6</td>
</tr>
<tr>
<td>Graduate Elective OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS655 Curriculum and Program Dev ++ OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS665 Educational Eval ++ OR</td>
<td>3</td>
</tr>
<tr>
<td>Thesis *** and</td>
<td>1-3</td>
</tr>
<tr>
<td>Culminating Graduate Project*</td>
<td>0</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>9</strong></td>
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</tbody>
</table>

**PNP = 50 credits**

**+ Graduate Elective (500+ or higher graduate level course)**

**++ Education Minor (9 credits):** Students choosing to complete The Education Minor will take the required course NURS565 and the following two courses as their graduate electives.
- NURS655: Curriculum and Program Development
- NURS665: Educational Evaluation

**+++ Thesis Option:** Students choosing to complete a Thesis will take NURS700 (6 credits) and graduate Statistics elective.

<table>
<thead>
<tr>
<th>PREREQUISITES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS640 requires NURS621</td>
</tr>
<tr>
<td>NURS655/NURS665 requires NURS565</td>
</tr>
<tr>
<td>NURS686 requires NURS607</td>
</tr>
<tr>
<td>NURS687 requires NURS686</td>
</tr>
<tr>
<td>NURS688 requires NURS687</td>
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</table>

<table>
<thead>
<tr>
<th>PRE/COREQUISITES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS607 requires NURS621</td>
</tr>
<tr>
<td>NURS686 requires NURS616; NURS640</td>
</tr>
<tr>
<td>Culminating Graduate Project is required if Thesis is not chosen</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Year One Fall Semester</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>NURS565 Nurse as Educator</td>
<td>3</td>
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<td>NURS612 Family Nursing Theory</td>
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<td>NURS614 Clinical Pathophysiology</td>
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</tr>
<tr>
<td>NURS607 Advanced Health Assessment</td>
<td>3</td>
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<td><strong>TOTAL</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Year One Spring Semester</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>NURS641 Clin Mgmt/FNP I</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year One Summer Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS613 Innovations in Information, Quality and Safety</td>
<td>3</td>
</tr>
<tr>
<td>NURS700 Thesis *** (Optional)</td>
<td>1-3</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3-6</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year Two Fall Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS626 Leadership for APN</td>
<td>3</td>
</tr>
<tr>
<td>NURS642 Clin Mgmt/FNP II</td>
<td>6</td>
</tr>
<tr>
<td>Graduate Elective OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS655 Curriculum and Program Dev ++ OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS665 Educational Eval ++ OR</td>
<td>3</td>
</tr>
<tr>
<td>Thesis *** and</td>
<td>1-3</td>
</tr>
<tr>
<td>Graduate Statistics Elective</td>
<td>3</td>
</tr>
<tr>
<td>(500+ or higher)+, ++, +++</td>
<td>3</td>
</tr>
<tr>
<td>Culminating Graduate Project*</td>
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<tr>
<td><strong>TOTAL</strong></td>
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<table>
<thead>
<tr>
<th>Year Two Spring Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS643 Clin Mgmt/FNP III</td>
<td>6</td>
</tr>
<tr>
<td>Graduate Elective OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS655 Curriculum and Program Dev ++ OR</td>
<td>3</td>
</tr>
<tr>
<td>NURS665 Educational Eval ++ OR</td>
<td>3</td>
</tr>
<tr>
<td>Thesis *** and</td>
<td>1-3</td>
</tr>
<tr>
<td>Culminating Graduate Project*</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

**FNP = 50 credits**
MS Curriculum: Family Psychiatric Nurse Practitioner (FPMHNP)

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

### Year One Fall Semester
**Credits**
- NURS565 Nurse as Educator 3
- NURS612 Family Nursing Theory 3
- NURS621 Clinical Pathophysiology 3
- NURS607 Advanced Health Assessment 3
- NURS609 Family Psychiatric & Mental Health Theory 3
**TOTAL 15**

### Year One Spring Semester
**Credits**
- NURS640 Pharmacology 3
- NURS641 Clin Mgmt/PHC FNP I OR NURS686 Clin Mgmt/PNP I 5
- NURS627 Clinical Management/FPMHNP I 5
**TOTAL 8**

### Year One Summer Semester
**Credits**
- NURS613 Innovations in Information, Quality and Safety 3
- NURS700 Thesis ***Optional) 1 - 3
**TOTAL 3 - 6**

### Year Two Fall Semester
**Credits**
- NURS626 Leadership for APN 6
- Culminating Clinical Project 0
- NURS628 Clinical Management/FPMHNP II 6
**TOTAL 12**

### Year Two Spring Semester
**Credits**
- NURS629 Clinical Management/ FPMHNP III 6
- Graduate Statistics Elective 3
- (500+ or higher)+, ++, +++ 3
- Culminating Clinical Project 0
**TOTAL 9**

**CREDITS MS: FPMHNP = 48 credits 48 (FPMHNP)**

+ Graduate Elective (500+ or higher graduate level course)
++ Education Minor (9 credits): Students choosing to complete The Education Minor will take the required course NURS 565 and the following two courses as their graduate electives:
- NURS655: Curriculum and Program Development
- NURS665: Educational Evaluation
+++ Thesis Option: Students choosing to complete a Thesis will take NURS 700 (6 credits) and graduate Statistics elective.

Post Masters Advanced Certificates

**Family Nurse Practitioner & Family Psych Mental Health Nurse Practitioner (FNP & FPMHNP)**

The Nurse Practitioner Post Master's Program is open to registered nurses with clinical master's degrees who wish to become nurse practitioners and to certify nurse practitioners with master's degrees who wish to become certified in an additional specialty area.

### Year One Fall Semester
**Credits**
- NURS621 Clinical Pathophysiology 3
- NURS607 Advanced Health Assessment 3
- NURS512 Family Nursing Theory * 3
- NURS609 Family Psych MentHlth Theory (FPMHNP only) 3
**TOTAL 9**

### Year One Spring Semester
**Credits**
- NURS640 Pharmacology 3
- NURS641 Clin Mgmt/ PHC FNP I OR 5
- NURS686 Clin Mgmt/ PNP I OR 5
- NURS627 Clin Mgmt/FPMHNP I 5
**TOTAL 8**

### Year Two Fall Semester
**Credits**
- NURS682 Clinical Mgmt /PHC FNP II OR 6
- NURS687 Clin Mgmt/PNP II OR 6
- NURS628 Clinical Mgmt/FPMHNP II 6
**TOTAL 6**

### Year Two Spring Semester
**Credits**
- NURS643 Clinical Mgmt /PHC FNP III OR 6
- NURS688 Clinical Mgmt/PNP III OR 6
- NURS629 Clinical Mgmt/FPMHNP III 6
**TOTAL 6**

**TOTAL CREDITS 29**

**PREREQUISITES:**
- NURS640 requires NURS621
- NURS655/NURS665 requires NURS565
- NURS627 requires NURS607; NURS609
- NURS628 requires NURS627
- NURS629 requires NURS628

**PRE/Corequisites:**
- NURS607 requires NURS621
- NURS609 requires NURS607
- NURS640 requires NURS612 and NURS565
- NURS628 requires NURS612 and NURS565
**Nursing Education Curriculum**

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.

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<tr>
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<tbody>
<tr>
<td>Nurse as Educator</td>
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<tr>
<td>Curriculum and Program Development</td>
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<tr>
<td>Educational Evaluation</td>
<td>3</td>
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<td><strong>TOTAL</strong></td>
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**TOTAL CREDITS**

9

**PREREQUISITES:**

NURS655 - Pre-requisite to NURS655 & 665  
+ NURS655 - Offered both Fall and Spring semesters  
+++NURS655 - Offered Spring and Fall semesters

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

**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. This results in clinical practice that promotes safe, effective, and equitable patient care at the population and system levels, as well as for individual patients.

The part-time post Masters’ DNP degree consists of 40 semester hours, which are completed in five 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 that you will be required to complete to meet graduation requirements.

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<thead>
<tr>
<th>Year One Fall Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS613 Advancements in Information, Quality and Safety</td>
<td>3</td>
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<tr>
<td>NURS632 Biostatistics</td>
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<tr>
<th>Year One Spring Semester</th>
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<tbody>
<tr>
<td>NURS711 Org. Behavior and Systems Leadership</td>
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<td>NURS620 Legal and Ethical Issues</td>
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**Year One Summer Semester**

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<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS608 Epidemiology and Population Health</td>
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**Year Two Fall Semester**

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<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>NURS710 Evidence Based Practice</td>
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<tr>
<td>NURS637 Program Development and Grant Writing</td>
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**Year Two Spring Semester**

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<th>Credits</th>
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<tbody>
<tr>
<td>NURS605 Public Health Policy</td>
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<tr>
<td>NURS722 Post-Master Clinical Capstone I (150 hrs)</td>
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<tr>
<td>NURS723 Graduate Elective</td>
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**Year Three Fall Semester**

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<th>Credits</th>
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<tbody>
<tr>
<td>NURS725 Post-Master Clinical Capstone III (225 hrs.)</td>
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**Course**  | **Pre-requisite**
---|---
NURS608  | NURS632
NURS637  | NURS608
NURS722  | NURS710
NURS723  | NURS722
NURS735  | NURS723
NURS711 Org. Behavior and Systems Leadership | 3
NURS620 Legal and Ethical Issues | 3
**TOTAL** | 6

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Nursing Course Descriptions

Bachelor of Science

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. This course focuses on identifying the scope of professional nursing practice from an evolutionary perspective. Emphasis is on exploring the historical trends on the development and implementation of the professional nursing role. The mission and philosophy of the College of Nursing are discussed and the students articulate their philosophy from a professional and personal perspective. An overview of the theoretical bases for professional nursing is interrelated with current models of practice.

NURS387 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. Emphasis is on the development of public policy related to health care. Attention also is given to the local, state, and federal systems for financing and delivering health care with consideration of the issues of access and distribution of services. Students will compare and contrast the U.S. with international healthcare systems.

NURS414 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.

NURS415 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.

NURS420 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 healthcare and the communities served by nursing and other health care professionals. There is a specific emphasis on current ethical dilemmas, bioethics, legal issues and responsibilities in health care, and the inter-professional collaboration of the health care team. The course will meet the undergraduate nursing elective requirement for health care ethics.

NURS444 Community Health Nursing (4 Credit Hours): PREREQUISITE NURS326; PRE/COREQUISITES Epidemiology This course focuses on the theory and practice of community health nursing incorporating public health science with its roots in epidemiology and the art and science of nursing. Emphasis is on population-focused nursing with the application of Healthy People to promote healthy communities. Using available community resources, students develop advanced communication skills in collaborating with the healthcare team to plan, implement, and evaluate interventions to improve the overall health of communities.

NURS456: Information, Quality and Safety (3 credits): PRE-REQUISITE NURS481. This course introduces the skills and knowledge to implement healthcare technologies, promote quality, maintain patient safety, and manage information across healthcare settings. The course combines evidence-based concepts from technology, information science, communication studies, patient safety, organizational quality, and health care science to prepare nurses to participate in the process of improving healthcare quality and safety. The content explores current and potential uses for technology in transforming healthcare. Emphasis is placed on the nurses' active role in retrieving, interpreting, and sharing information to promote positive patient outcomes.

NURS481 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. Information will be provided to assist the student to critique selected nursing research studies, with the opportunity for evaluating and using research findings in relation to nursing practice. NURS565

NURS565 Nurse as Educator (3 Credit Hours): PRE-REQUISITE NURS481 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.

NURS484/584 Trends in Practice and Health Care (3 Credit Hours): PRE/COREQUISITE NURS481 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 clinical project and to see nurses in expanded roles in today’s health care system.

Master of Science

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.

NURS607 Advanced Health Assessment (3 Credit Hours): PRE/COREQUISITES NURS621 This is the first course in the clinical advanced practice nurse (APN) series with a focus on advanced physical assessment, enhanced communication skills, and the reinforcement of health promotion and disease prevention across the life span. The course work and clinical lab activities enhance the student’s history taking proficiency, physical assessment skills, critical thinking, and decision-making competency essential for planning, delivering, and evaluating health care in the population.

NURS609 Family Psychiatric and Mental Health Therapy (3 Credit Hours): PRE/COREQUISITES 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 of psychiatric disorders and developmental, family and psychodynamic processes. Introduction to theories, concepts and models relevant to the

FPMHNP’s role in the care of persons with mental illnesses and populations at risk are examined.

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 life span. Psychosocial, cultural, economic, gender, and spiritual variables and their impact on family life are analyzed.

NURS613 Innovation in Information, Quality, and Safety (3 Credit Hours): This course focuses on the skills and knowledge needed to 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 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 course focuses on the appraisal and use of research and best evidence. 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 develop 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 research process, and statistics is expected of students before entering the course.

NURS621 Clinical Pathophysiology (3 Credit Hours): This course focuses on the causality of alterations in human
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/FNP I (5 Credit Hours): **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. Students develop an understanding of the pathologic changes and clinical manifestations that characterize common acute disorders. Students apply new understanding of pathophysiology and evolving clinical decision making skills to the interpretation of assessment data, the diagnosis of illness, and the treatment of primary care across the lifespan.

NURS642 Clinical Management/FNP II (6 Credit Hours): **PREREQUISITES NURS641** This course reflects a building of knowledge and skills from the previous clinical course, 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.

NURS643 Clinical Management/FNP III (6 Credit Hours): **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.

NURS655 Curriculum and Program Dev (3 Credit Hours) **PREREQUISITE NURS565.** Course 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. 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. Using seminar and other adult learning formats, 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 are available to students.
NURS665 Educational Eval (3 Credit Hours)
**PREREQUISITE NURS565** 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. Using various methodologies to determine learner performance in classroom, laboratory and clinical settings, test development, are explored for use in course evaluations. Educational program assessment and evaluation is reviewed using accreditation standards and other benchmarking tools. Individually-designed practicum experiences allow students to gain a broader perspective on the educator role in teaching and administration.

NURS686 Clinical Management 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 builds 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 evolving clinical decision making skills to the interpretation of assessment data, pathophysiology, 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.

NURS687 Clinical Management PNP II (6 Credit Hours):
**PREREQUISITE NURS686** The student, building on knowledge and skills from PNP I, continues to progress in the PNP role and in the delivery of health care to patients with acute and chronic health care needs. Collaboration guides the students in the implementation and 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 evidence-based research are integrated along with complementary healing approaches appropriate for the child health population.

NURS688 Clinical Management 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 discussed including ethical concepts and effective use of resources for beginning autonomous practice. Concepts of organizational systems and health care policies and policy are applied to the PNP setting to solve complex problems.

NURS700 Thesis (1 – 3 Credit Hours): Provides an opportunity to conduct 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.

**Post Master’s Certificate**
The purpose of the post-master’s certificate program is to provide, for nurses who already hold a master’s degree in nursing, an educational route to specialization in an area other than that obtained in their master’s program. The program is designed to strengthen or broaden the clinical or educational capabilities of master’s-prepared nurses. For complete course descriptions see the Masters’ course descriptions.

**Nursing Education Curriculum**
This two- to three-semester post master's 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 the minor receive a certificate upon completion.

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<td>Educational Evaluation</td>
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| TOTAL CREDITS 9 |

**Family Nurse Practitioner & Family Psych Mental Health Nurse Practitioner (FNP & FPMHNP)**
The Nurse Practitioner Post Master's Program is open to registered nurses with clinical master's degrees who wish to become nurse practitioners and to certify nurse practitioners with master's degrees who wish to become certified in an additional specialty area.

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<th>Clinical Pathophysiology</th>
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<td>Advanced Health Assessment</td>
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<td>Family Nursing Theory *</td>
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<tr>
<td>Family Psych MentHlth Theory (FPMHNP only)</td>
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<td>Pharmacology</td>
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<td>Clin Mgmt/ PHC FNP I OR</td>
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<td>Clin Mgmt/ PNP I OR</td>
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<td>Clin Mgmt/FPMHNP I</td>
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Doctor of Nursing Practice

NURS731 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.

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.

NURS632 Biostatistics (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 (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 into 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.

TOTAL CREDITS 29
NURS722  DNP Project I (3 Credit Hours): PRE-
REQUISITE NURS710 This course is the first of three sequential clinical course 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): PRE-
REQUISITE 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 focus on advancing the body of nursing practice knowledge and addressing advocacy at all levels of policy implementation. Students will apply knowledge and skills in order to address the ethical, legal, financial, and organizational aspects of the project. The DNP student evaluates the project and the impact on health care outcomes. Students will disseminate their findings through an oral presentation and a manuscript suitable for a peer-reviewed publication. The student will complete a minimum of 225 clinical hours. This course culminates in a successful oral defense.
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**

**MPOM201 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