Chemistry Degree

- Applied Physical Science M.S. (http://catalog.georgiasouthern.edu/graduate/science-mathematics/chemistry/applied-physical-sciences)

CHEM 5233G Environmental Chemistry
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A survey of the current environmental issues and the underlying chemistry associated with them, including stratospheric chemistry, air pollution, global climate change, toxic organic chemicals, natural water systems, soil chemistry, and energy production. Graduate students will be given an extra assignment determined by the instructor that undergraduates will not be required to do.
Prerequisite(s): A minimum grade of "C" in CHEM 2242 and CHEM 3342.
Cross Listing(s): CHEM 5233.

CHEM 5311G Advanced Organic Chemistry
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A course designed to build upon the knowledge gained in CHEM 3341 (Organic I) and CHEM 3342 (Organic II). Topics covered will include considerations of structural and mechanistic organic chemistry, synthetic organic chemistry and bioorganic chemistry.
Prerequisite(s): A minimum grade of "C" in CHEM 3342.
Cross Listing(s): CHEM 5331.

CHEM 5322G Principles of Drug Design
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
A course designed to introduce the chemistry of drug design and development, as well as drug actions and their impacts on society. Topics include drug discovery, receptor site theory, neurotransmitters, pharmacokinetics, federal drug laws, drugs in sports and individual classes of drugs.
Prerequisite(s): A minimum grade of "C" in CHEM 3342.
Cross Listing(s): CHEM 5332.

CHEM 5333G Carbohydrate Chemistry
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course provides students with an introduction to the chemistry of carbohydrates. Topics include structural aspects, stereochemistry, synthesis, conformational analysis, polysaccharides, and vaccine development.
Prerequisite(s): A minimum grade of "C" in CHEM 3342.
Cross Listing(s): CHEM 5333.
CHEM 6133  Photronics Plasmonics & Metamat  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
The course offers an introduction into theory and models related to photonicics and electronics of photonic crystals, plasmonic metal nanostructures, metal-dielectric metamaterials and metasurfaces, localized scatterers and emitters. Students will improve their overall understanding of how these methods and models apply to practical systems related to spectroscopy, imaging, excitation and control over condensed, chemical and biological nano- and microstructures. The course covers a broad range of topics including: dielectric properties of materials in relation to their electronic structure, propagation and emission of radiation in strongly inhomogeneous and anisotropic materials, introduction into plasmonics, properties of photonic crystals and metamaterials, Mie theory of light scattering and near-fields at micro and nanoparticles, optical forces and tweezers, energy and momentum transfer in light-matter interactions and others.

CHEM 6230  Scientific Inquiry and Ethics  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course will provide a foundation in modern research methods, data handling and analysis, and a grounding in the current standards for scientifically ethical behavior and publishing.

CHEM 6730  Master of Science in Physical Science Internship  
3 Credit Hours.  0 Lecture Hours.  0 Lab Hours.  
This course is the required internship for the Master of Science in Physical Science (MSPS) degree. Students will apply their skills and knowledge to a current problem in a professional setting, either on campus or at the site of a participating sponsor.

CHEM 7031  Molecular Visualization  
3 Credit Hours.  0 Lecture Hours.  3 Lab Hours.  
Focuses on computer skills related to building and presenting molecular information in the High School Science context. All content will be introduced through tutorial exercises provided as handouts. Intended as an elective in Chemistry for graduate students in the M.Ed. and Ed.S. Science Education programs.

CHEM 7042  Chemistry for Secondary Teachers  
4 Credit Hours.  2 Lecture Hours.  4 Lab Hours.  
This course will emphasize the skills necessary to create and execute effective physical science demonstrations and laboratory experiments appropriate for secondary students, using common, inexpensive, easily-purchased, and easily-disposed of materials. Lab periods will be used to develop and implement demos and experiments based on the topics covered in lecture. This course is intended as a Chemistry elective for graduate students in the M.Ed. and Ed.S. Science Education programs.  
Prerequisite(s): One year of college chemistry.

CHEM 7090  Selected Topics/Chemistry  
1-6 Credit Hours.  0-6 Lecture Hours.  0-6 Lab Hours.  
A course taught on a one time basis. Lecture only courses will be three credit hours while courses with a laboratory will be four credit hours.

CHEM 7130  Sustainability in the Physical Sciences  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course will provide an overview of sustainability, including current standards of sustainability, quantitative methods of measurement, and current applications of sustainable practices. The twelve Principles of Green Chemistry and Engineering will form the foundation of this course. Case studies, analysis of sustainability trends and common practices, and future research will be covered. Lifecycle analysis, current best practices in sustainability, the triple bottom line, social impacts of sustainability, and other topics will be discussed.

CHEM 7231  Theoretical Chemistry  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
Chemistry research is increasingly supported by quantum chemical computations. This course will provide students with a complete understanding of ab initio quantum chemistry. Students are exposed to Hartree-Fock, MP2, and Coupled Cluster Theory in addition to basis sets and practical computational approaches. Upon completion, students will be able to choose a proper computational method, to diagnose issues that may arise within such computations, and also to compare methods from mathematical arguments. Prior knowledge in quantum chemistry and/or mechanics is highly recommended.

CHEM 7232  Toxicology of Nanomaterials  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course covers concepts related to the toxicity of nanomaterials. Students will design methods for studying nanomaterial toxicity as well as for profiling various classes of nanomaterials.

CHEM 7334  Polymer Materials  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course will introduce students to the world of polymer materials, which are ubiquitous in daily life around the world. It will cover the chemistry of hard and soft polymers, applied polymer science, and the analysis of polymeric materials. This course will also cover how polymers are synthesized and characterized, what unique properties polymers have, and how polymer materials are used. Material covered will include different ways of synthesizing polymers, including step, chain (free radical, “controlled” free radical, ionic), catalytic, and ring opening polymerizations. Important concepts on polymer structure, molecular weight and its distribution, glass transition, and amorphous versus crystalline state will be introduced. Various physical properties and applications of polymers, including mechanical and electrical properties, will also be briefly described.

CHEM 7335  Coatings Technology  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course will introduce the fascinating field of coatings technology, which is widely applied in daily life. The course will cover what a coating is typically composed of, what typical coating binders are and how they are made, how to formulate a coating (different coating categories), and how typical coatings properties are affected by various ingredients.

CHEM 7531  Chemistry of Biomolecules I  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course covers the fundamental structure and function of the three major classes of biomolecules: proteins, lipids, and carbohydrates, as well as signal transduction, DNA technologies, and membrane transport.

CHEM 7532  Chemistry of Biomolecules II  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course covers the catabolism and anabolism of biomolecules of proteins, lipids, and amino acids and examines nucleic acid chemistry, including DNA replication, transcription, translation, and recombinant DNA technology.

CHEM 7630  Graduate Seminar  
3 Credit Hours.  3 Lecture Hours.  0 Lab Hours.  
This course will consist of formal seminars and informal sessions on current topics of interest to the program as presented by visiting lecturers, local researchers, and students. All MS-APS students must attend a set number of seminars each term they are enrolled in the program. Thesis track students in their final semester will prepare a comprehensive presentation on their thesis research as well as submit a report reviewing the topics covered during the seminar series.

CHEM 7895  Research  
1-3 Credit Hours.  0 Lecture Hours.  0 Lab Hours.  
Graduate students will pursue, under the direction of their advisory committee, a program of independent research in a particular area of physical science. Results of the research will be presented as a thesis in partial fulfillment of the Master of Science in Applied Physical Science degree.
CHEM 7999  Thesis
1-3 Credit Hours.  0 Lecture Hours.  0 Lab Hours.
Results of an individual, independent research project will be presented as
a thesis in partial fulfillment of the Master of Science in Physical Science
degree. The thesis requires defense of the design, execution, analysis,
and interpretation of the research project.