

## INTEGRATED SCIENCE AND TECHNOLOGY (ISAT)

**592. Research and Development in Industrial Technology.** Credit 3 hours. Prerequisites: An overall "B" average or recommendation by the faculty and approval of the Department Head. A course devoted to research and development through laboratory experimentation of selected problems of specific interest. Course may be repeated for a total of six hours with no more than three hours in any one semester.

**600. Applied Science Seminar I.** Credit 3 hours. Students in the program will be expected to take the two three-credit hour applied science seminars during their first two semesters in the program. The purpose of these seminars is to develop the student's research skills in an applied setting and to show students how interdisciplinary study will benefit their career aspirations. Students will be expected to examine the effects and applications of emerging technology in industry. Problem solving models and techniques will be illustrated and applied. Sharing of professional knowledge and expertise is expected in the flow of classroom interaction. Guest speakers from regional businesses and industries will be an integral part of these seminars.

**601. Applied Science Seminar II.** Credit 3 hours. Prerequisite: Completion of ISAT 600. This seminar is a continuation of ISAT 600. The course is intended to further develop the students research skills through projects involving current technology. The course will continue to present students with a broad range of current industrial practices. It will also assist students in selecting their team-based project.

**615. Technology in Industry and Society.** Credit 3 hours. Prerequisite: ISAT 600 or concurrent enrollment. This course investigates the historical evolution of technology for use in developing models appropriate for predicting future technological trends. The course provides technical understanding and communication skills needed across the disciplines of mathematics, chemistry and physics, industrial technology, and computer science. The course provides and understanding of the impact of technology on individuals, the global community and the environment.

**625. Applications of Computing in Science and Technology.** Credit 3 hours. Prerequisite ISAT 600 or concurrent enrollment. Applications of computing in applied research labs, business, and industry settings. Topics include inter and intro-networking; information acquisition, storage and retrieval; process control systems; mathematical models; and chemical process control models.

**635. Industrial Chemistry.** Credit 3 hours. Prerequisites: ISAT 600 or concurrent enrollment. This course will be of a survey nature. It will introduce the student to the importance of the chemical industry to our economy as a whole and inform the student about the role of the chemist in typical plant operations such as quality control and assurance, safety compliance, and research and development. In addition, the student will become acquainted with some important industrial processes in the chemical industry.

**645. Mathematical Modeling for Science and Technology.** Credit 3 hours. Prerequisite: ISAT 600 or Concurrent enrollment. A study of typical operation research problems representative of various business and industrial organizations. These problems include production planning, distribution and scheduling, inventory control, project planning and control, simulation and forecasts of sales.

**655. Error and Risk Analysis.** Credit 3 hours. Prerequisite: ISAT 600 or concurrent enrollment. This course will present the basic tools of error and risk analysis, with extensive use of case studies. The goal of this course is to provide students with the mathematical and physical problem-solving skills to attack similar data-driven problems and to understand the methods by which data are converted into information for decision making.

**665. Industrial Internship.** Credit 3 hours. Prerequisite: ISAT 600, 601, 9 hours of lower level core courses and permission of the ISAT coordinator. This course is a cooperative venture between Southeastern Louisiana University and a variety of business, industry, governmental, or educational institutions. It combines the student's academic and technical preparation at the University with actual on-the-job experiences. Grades assigned on a Pass/Fail basis only.

**770. Thesis.** Credit 1-6 hours each semester with 6 hours needed for graduation. Prerequisites: ISAT 600, 601 and approval of Program Coordinator. The thesis will investigate a significant interdisciplinary topic centered in the area of the student's concentration. The results must provide a significant contribution to the knowledge base in the discipline. The thesis is graded Pass/Fail. The student must enroll in the thesis course each semester that the thesis is in progress.

**771. Research Project.** Credit 1-6 hours each semester with 6 hours needed for graduation. Prerequisites: ISAT 600, 601 and approval of Program Coordinator. Students will design and implement a research project. Research projects will investigate a significant interdisciplinary, applications-oriented topic centered in the area of the student's concentration. The research project is graded Pass/Fail. The student must enroll in the research project course each semester that the research is in progress.

**677. Ab Initio Quantum Chemistry.** Credit 3 hours. Prerequisites: PHYS 351 or CHEM 395 or permission of the Dean. A course on numerical methods for solving the electronic Schrodinger equation. Topics include self-consistent field methods for molecular orbitals, discretization of partial differential equations using Gaussian basis sets, semi-empirical molecular orbital methods, methods for going beyond self-consistent fields:

density functional methods and many-body theory. Students will write programs to compute semi-empirical molecular orbitals.

**678. Computational Optimization.** Credit 3 hours. Prerequisites: MATH 312, MATH 350, and MATH 360. This is a course on continuous and discrete optimization. Several standard optimization problems along with their numerical and idea solutions will be discussed. Possible topics include unconstrained optimization using vector calculus, Lagrange multipliers, Kuhn-Tucker conditions, Conjugate Gradient Methods, Hilbert space methods in optimization, Linear Programming (simple and interior point methods), quadratic programming shortest path problems, minimal spanning trees, and stochastic optimization.