Approved School of Science & Engineering Capstone Courses

Biological Chemistry Capstone Courses

CELL 424 Seminar in Morbidity and Mortality (3)
Prerequisite: CELL 422. This is a seminar course that will focus on recent reports of bacterial or viral diseases in the “Morbidity and Mortality Weekly Report” (MMWR) published by the Centers for Disease Control and Prevention. Students will read selected reports each week that will be analyzed in detail in class. In addition, each student will write a term paper and give an oral presentation in class. Lectures only.

CELL 425 Principals in Immunology (3)
Prerequisite: CELL 301. An introduction to the biology of the human immune system with review of relevant literature.

CELL 426 Principals of Biomedical Writing (3)
Prerequisites: CELL 301 or CELL 311 or CELL 401. An examination of various types of scientific literature, scientific writing and presentation. Exploration of scientific databases such as PubMed. Emphasis on critical reading of scientific literature and writing in a scientific style. Writing Intensive

CELL 495, 496 Special Projects in Cell and Molecular Biology (1-3, 1-3)
Individual studies in a selected field. Open to qualified students with approval of instructor and advisor. Must be taken with CELL 511

CELL 491, 492 Independent Studies (1-3, 1-3)
Staff. Laboratory or library research under direction of a faculty member. Must be taken with CELL 511

CENG 431 Chemical Process Design (3) Lecture (3)
Prerequisites: Senior standing or departmental approval. The elements of industrial design and supporting economics are presented in the context of a representative design project. Extension of the student’s early background in unit operations through practical design considerations including materials of construction is accomplished. Methods are presented for capital and operating cost estimation, raw materials and utilities pricing, and assembly of investment costs, taxes, environmental and other site requirements. Realistic design constraints are included; e.g., economic factors, safety, reliability aesthetics, ethics, and social impact.

CENG 460 & 462 Practice School or Cooperative Work Program (3, 3) Lecture plus Practicum 8
Prerequisite: Senior Standing. Students are placed in groups of three or four and are assigned to a project at a local industrial facility, hospital, or government agency. The project is one of current concern to the organization and may range from a study of an operating process to the development of a new process. The projects are open ended and the students are expected to apply the principles of good design practice involving realistic constraints such as economics, safety, reliability, aesthetics, ethics, and social impact. Students normally are assigned to a project which fulfills certain career goals. This internship, under the direction of a faculty member, utilizes engineers and other personnel at the host site. Students are required to submit interim and final written and oral reports.

CHEM 401/402 Research and Seminar (1 or 3)
Prerequisite: junior standing or approval of department. Individual research supervised by the faculty. Students are expected to present a short seminar based on their research. At least ten hours of research effort per week. A maximum of three credits may be taken. Must be taken with CHEM 511.

511 Capstone Requirement (0)
Corequisite: Chem 401 or Chem 402
Biomedical Engineering Capstone Courses

**BMEN 404 Team Design Projects II (2,3)**
Prerequisite: Senior standing. Techniques and experience in the solution of constrained and open-ended design problems. Lecture topics include all aspects of the design process, including goal setting, idea generation, prototyping, fabrication, and product and evaluation. Also included are technical presentation, project planning and management. Included as needed are other topics such as standards, fastening and joining, motors and control, esthetics and finish. Each team will design and construct a device or system to assist an individual with a disability. These designs are presented in a public show during the second semester. This course satisfies the service learning requirement when co-registered for BMEN 489.

Cell & Molecular Biology Capstone Courses

**CELL 424 Seminar in Morbidity and Mortality (3)**
Prerequisite: CELL 422. This is a seminar course that will focus on recent reports of bacterial or viral diseases in the “Morbidity and Mortality Weekly Report” (MMWR) published by the Centers for Disease Control and Prevention. Students will read selected reports each week that will be analyzed in detail in class. In addition, each student will write a term paper and give an oral presentation in class. Lectures only.

**CELL 425 Principals in Immunology (3)**
Prerequisite: CELL 301. An introduction to the biology of the human immune system with review of relevant literature.

**CELL 426 Principals of Biomedical Writing (3)**
Prerequisites: CELL 301 or CELL 311 or CELL 401. An examination of various types of scientific literature, scientific writing and presentation. Exploration of scientific databases such as PubMed. Emphasis on critical reading of scientific literature and writing in a scientific style. Writing Intensive

**CELL 495, 496 Special Projects in Cell and Molecular Biology (1-3, 1-3)**
Individual studies in a selected field. Open to qualified students with approval of instructor and advisor. Must be taken with CELL 511

**CELL 491, 492 Independent Studies (1-3, 1-3)**
Staff. Laboratory or library research under direction of a faculty member. Must be taken with CELL 511

Chemical & Biomolecular Engineering Capstone Courses

**CENG 431 Chemical Process Design (3) Lecture (3)**
Prerequisites: Senior standing or departmental approval. The elements of industrial design and supporting economics are presented in the context of a representative design project. Extension of the student’s early background in unit operations through practical design considerations including materials of construction is accomplished. Methods are presented for capital and operating cost estimation, raw materials and utilities pricing, and assembly of investment costs, taxes, environmental and other site requirements. Realistic design constraints are included; e.g., economic factors, safety, reliability aesthetics, ethics, and social impact.
CENG 460 & 462 Practice School or Cooperative Work Program (3, 3) Lecture plus Practicum 8
Prerequisite: Senior Standing. Students are placed in groups of three or four and are assigned to a project at a local industrial facility, hospital, or government agency. The project is one of current concern to the organization and may range from a study of an operating process to the development of a new process. The projects are open ended and the students are expected to apply the principles of good design practice involving realistic constraints such as economics, safety, reliability, aesthetics, ethics, and social impact. Students normally are assigned to a project which fulfills certain career goals. This internship, under the direction of a faculty member, utilizes engineers and other personnel at the host site. Students are required to submit interim and final written and oral reports.

Chemistry Capstone Courses

CHEM 401 Research and Seminar (1 or 3)
Prerequisite: junior standing or approval of department. Individual research supervised by the faculty. Students are expected to present a short seminar based on their research. At least ten hours of research effort per week. A maximum of three credits may be taken. Must be taken with CHEM 511.

CHEM 402 Research and Seminar (1 or 3)
Same as Chemistry 401 in organization. A maximum of three credits may be taken. Must be taken with CHEM 511.

CHEM 401/402 Research and Seminar (1 or 3)
Prerequisite: junior standing or approval of department. Individual research supervised by the faculty. Students are expected to present a short seminar based on their research. At least ten hours of research effort per week. A maximum of three credits may be taken. Must be taken with CHEM 511.

511 Capstone Requirement (0)
Corequisite: Chem 401 or Chem 402

Earth & Environmental Sciences Capstone Courses

EENS 398 Environmental Field Study (4-6)
Prerequisites: EENS 327, approval of undergraduate advisor before enrollment. The application of basic field methods to practical problems in environmental science. Students typically complete this course at an approved summer field camp offered by another college or university. Students may pursue opportunities in groundwater hydrology, oceanography, remote sensing, environmental field methods, or environmental internships. Offered in the summer session only.

EENS 399 Field Geology (3-8)
Prerequisites: EENS 212, 327, 340 and approval of undergraduate advisor before enrollment. The application of basic field methods to practical problems in field geology, including the construction of geological maps. Students typically complete this course at an approved summer field camp offered by another college or university. Offered in the summer session only.

EENS 491, 492 Independent Studies (1 or 3, 1 or 3)
Must be taken with EENS 511.
Ecology & Evolutionary Biology Capstone Courses

**EBIO 497,498 Contemporary Ecology and Evolutionary Biology (1-3)**
The senior capstone experience for departing majors. Prerequisite EBIO 308. Corequisite EBIO 404, 414 and senior standing or approval of the instructor. Under faculty supervision, students select a research topic in ecology and evolutionary biology, write an expository paper on that topic and give an oral presentation of their findings. Students also attend departmental research seminars and meet to discuss contemporary issue in ecology and evolutionary biology. EBIO 497 is required of all department majors, EBIO 498 is required for all departmental majors who are not completing and honors thesis (EBIO H500) Both Courses must be completed to receive credit for the capstone experience. The capstone requirement is a university requirement and thus EBIO 497 and 498 do not count towards electives in the departmental majors.

**EBIO H499-H500 Honors Thesis (3, 4)**
Staff. For especially qualified juniors and seniors with approval of department and the Honors Committee. Students substituting EBIO 500 for EBIO 498 are required to attend all meetings for EBIO 498 and to present the Honors Thesis in EBIO 498. NOTE: Satisfies the capstone requirement.

Engineering Physics Capstone Courses

**ENGP 431 Team Design Project and Professional Practice I (3)**
Prerequisite: ENGP 231, 232, or approval of instructor. Design project taken in the fourth year of study with student teams. Advanced treatment of engineering design principles and an introduction to manufacturing processes. Students are presented with a product specification, and they must prepare a preliminary proposal, form a project team and develop a suitable design.

Mathematics Capstone Courses

**MATH 398 & 399 Seminar in Mathematics (1, 3)**
Prerequisites: MATH 305, 309, and two additional courses at the 300-level or above. Under faculty guidance, students will select a topic in current mathematical research, write an expository article on that topic, and give an oral presentation. This seminar is required of all mathematics majors who are not doing an Honors Project within the department. Writing Intensive

Neuroscience Capstone Courses

**NSCI 491, 492 Independent Studies (1-3, 1-3)**
Laboratory research under direction of a faculty member. Must be taken with NSCI 511

**NSCI 653 Psychopharmacology (3)**
Prerequisite: NSCI/PSYC 367 or approval of instructor. An introduction to the effects of psychoactive agents on the nervous system. Lectures emphasize the mechanisms by which drugs regulate neurotransmitter systems to alter psychological and physical states. Same as PSYC 653.

**NSCI 654 Psychopharmacology Laboratory (1)**
Corequisite: NSCI/PSYC 653. Prerequisite: PSYC 209. Laboratories provide demonstration and hands-on experience in research methods used in contemporary psychopharmacology including receptor measurement, models of drug abuse and psychopathology, data analysis, and manuscript preparation. Satisfies psychology laboratory requirement. Fulfills college laboratory requirement. Same as PSYC 654.
NSCI 657 Cognitive Neuroscience (3)
Prerequisites: PSYC 100, NSCI/PSYC 367 An introduction to the study of human behavior and cognition using neuroscience methods. The course will examine the neural basis of perception, attention, memory, language, motor control, and emotions. Same as PSYC 657.

NSCI 658 Cognitive Neuroscience Laboratory (1)
Corequisite: NSCI/PSYC 657. Prerequisites: PSYC 209 and instructor approval. A laboratory course that provides training in experimental design and ethical issues, data collection, analysis, and manuscript preparation for cognitive neuroscience experiments. Methods used in cognitive neuroscience School of Science and Engineering Neuroscience 2008-2009 Academic Year 673 research, such as event-related potentials, structural and functional MRI, also will be discussed. Students will conduct their own studies using behavioral and brain electrical activity measures. Satisfies psychology and neuroscience laboratory requirement. Same as PSYC 658.

NSCI 691 Neuroscience Capstone: Service and Clinical Applications of Neuroscience (3)
This course is designed for senior neuroscience majors who have completed their core course requirements of Brain and Behavior, Cellular Neuroscience and Systems Neuroscience. It is designed to be a culminating experience in which students utilize and apply their skills and knowledge developed over the course of their major. This course will have three versions. One; Service and Application of Neuroscience –will allow students to apply their knowledge of basic neuroscience in approved clinical or educational settings while providing service to the community. Second; Independent Research and Writing in Neuroscience – this is for students to do independent research in the laboratory of a neuroscience faculty member and to complete a written assignment that includes a review of the pertinent neuroscience literature and/or a summary of the completed research. Third; this option is for students to participate in a combination of journal club/seminar series, in which students will present and discuss neuroscience research articles and attend neuroscience seminars presented by researchers from Tulane and other institutions. For all three options each student will complete a final project to be agreed upon by the instructor and student.

Physics Capstone Courses

ENGP 431 Team Design Project and Professional Practice I (3)
Prerequisite: ENGP 231, 232, or approval of instructor. Design project taken in the fourth year of study with student teams. Advanced treatment of engineering design principles and an introduction to manufacturing processes. Students are presented with a product specification, and they must prepare a preliminary proposal, form a project team and develop a suitable design.

PHYS 491, 492 Independent Studies (1-3, 1-3)
Prerequisite: approval of instructor and chair of department. Must be taken with PHYS 511

PHYS H491, H492 Independent Studies (1-3, 1-3)
Prerequisite: approval of instructor and chair of department. Must be taken with PHYS 511
Psychology Capstone Courses

PSYC 456 & 457 Internship in Psychology (3)
Staff. Prerequisites: psychology major, junior or senior standing, GPA of 3.00 or higher, completed application to Center for Public Service. Students will complete 90 hours of service in a community setting in which they will use the knowledge of psychology to complete a project or paper of benefit to the community site. Must be taken with PSYC 511

PSYC 481, 482 Independent Project Laboratory (4, 4)
For individual research project done with a department faculty member. Generally includes hypothesis generation, design, consideration of ethical issues, data gathering, inferential analysis and the writing of work in acceptable scientific (APA) format. Satisfies, in part, the psychology laboratory requirement. Must be taken with PSYC 511

PSYC 501P, 502P Senior Capstone Lecture (3)
Lecture course in which several faculty members present a concentrated and integrated overview of theoretical issues in the diversity of disciplines in psychology (social, biological, developmental, application). Students complete a comprehensive exam and a capstone project. The project would generally be a historical treatment or theoretical integration and not an empirical study. One faculty member is responsible for coordinating the course and would serve as sponsor. With successful completion of exams and an integrative theoretical/historical project, the student will fulfill the N-T College capstone requirement. PSYC 501Satisfies: Capstone requirement for majors if student co-registers for PSYC 511.

PSYC 503P, 504P Senior Capstone Special Topics (3)
Capstone Course. Prerequisite senior standing and major in psychology. This lecture/seminar course is offered by a single member of the psychology department and represents a concentrated and integrated overview of a particular problem or area in psychology. The focus could be on social, biological, developmental or applied aspects of psychology. With successful completion of exams and an integrative theoretical/historical project, the student will fulfill the N-T College capstone requirement. PSYC 503 Satisfies: Capstone requirement for majors if student co-registers for PSYC 511.

PSYC 618 History and Systems of Psychology (3)
Prof. Christenson. Prerequisites: senior standing and approval of instructor. A survey of the roots of contemporary psychology. Students then identify an interest area, trace its historical roots, and present their work in class. Satisfies the departmental capstone requirement.

PSYC 653 Psychopharmacology (3)
Prof. Dohanich. Prerequisite: PSYC 367 or approval of instructor. An introduction to the effects of psychoactive agents on the nervous system. Lectures emphasize the mechanisms by which drugs regulate neurotransmitter systems to alter psychological and physical states. Same as NSCI 653.

PSYC 654 Psychopharmacology Laboratory (1)
Corequisite: PSYC 653. Prerequisite: PSYC 209. Laboratories provide demonstration and hands-on experience in research methods used in contemporary psychopharmacology including receptor measurement, models of drug abuse and psychopathology, data analysis, and manuscript preparation. Satisfies psychology laboratory requirements. Satisfies, in part, college laboratory requirement. Same as NSCI 654.

PSYC 658 Cognitive Neuroscience Laboratory (1)
Corequisite: PSYC 657. Prerequisites: PSYC 209 and PSYC 367. A laboratory course that provides training in experimental design and ethical issues, data collection, analysis, and manuscript preparation for cognitive neuroscience experiments. We will discuss methods used in cognitive neuroscience research, such as event related potentials, structural and functional MRI. Students will conduct their own studies using behavioral and brain electrical activity measures. Satisfies the departmental laboratory requirement. Same as NSCI 658.
PSYC 702 Developmental Psychology (3)
Students receive an in-depth overview of major theories and historical and contemporary research in developmental psychology. Readings and discussion are based on assignments of original journal articles and review papers and chapters in the main volumes of the field. Students will do several critiques of journal articles and review papers, in addition to other course work, as the capstone project. Satisfies: Capstone requirement for majors Instructor approval required to register, Newcomb Tulane and the Registrar form required for course to count toward bachelor’s degree, co-registration for PSYC 511.

PSYC 710 Psychopharmacology (3)
Students enrolled in this course as a capstone experience will complete the lecture and laboratory portions of the course, and attend a weekly seminar previously reserved for graduate students. In seminar, each student will read and discuss empirical research articles on current topics in the field of psychopharmacology, and lead one PowerPoint-assisted discussion of a topic of interest. Satisfies: Capstone requirement for majors Instructor approval required to register, Newcomb Tulane and the Registrar form required for course to count toward bachelor’s degree, co-registration for PSYC 511.

Any 300 level Psychology course may be taken to fulfill the capstone requirement provided PSYC 511 is taken along with the 300 level course.

Psychology/ Early Childhood Education Capstone Courses

EDUC 390 Methods II of Teaching Early Childhood: Mathematics and Science (3)
Staff. Pre-requisite: EDLA 200, EDLA 289, PSYC 320, PSYC 321, EDUC 300, EDLA 316, EDUC 340, EDUC 380 & 381, and EDUC 350. Co-requisite: EDUC 391. This course will prepare prospective teachers to teach science and mathematics in the early childhood (ages three through eight) setting. Theories and methodologies will be explored. Special attention will be given to developmentally appropriate activities, and a great emphasis will be placed on integrating subject matter and utilizing manipulatives. Technology issues will also be covered. Class Type: (ECE)