

## SCIENCE & ENGINEERING (SCEN)

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### SCEN 1010 Communicating Science:Teaching (1)

As the high schools in New Orleans rebuild, one of their many challenges is the uneven level of preparation among students entering the 9th grade. At the New Orleans Charter High School for Science and Math (SciHi), founded by two Tulane professors, the students are motivated but the disparities in their backgrounds are enormous. In this course, we learn how to help high school students who've fallen behind, both academically and by understanding the origins of their difficulty. Then we apply that knowledge by working with the students and also fulfilling one of the Tulane Center for Public Service requirements. The service, a minimum of 30 hours over the course of a semester, can take the form of teaching, tutoring, assisting with in-class exercises, and always includes acting as a mentor and role model to the SciHi students.

### SCEN 1015 Computers & Musical Creativity (3)

For high school students enrolled in the TSSP summer program.

### SCEN 1020 Comm Sci:1st Lego League (1)

If you are looking for a service learning opportunity this fall, in this course, you will mentor a middle-school robotics team using FIRST LEGO League (FLL) as a platform. Typically run on-site as an after-school program, FLL provides motivation in STEM fields (Science, Technology, Engineering, and Math) by requiring middle-school students to design and build a LEGO robot and prepare a 5-minute research presentation on the theme of the challenge. Past themes have involved Trash/Recycling, Natural Disasters, Senior Citizens, Biomedical Engineering, Climate, Energy, and Nanotechnology. Tulane students will assist the teams throughout the semester and will accompany them to the qualifying competition in New Orleans in November and potentially the state competition in New Orleans in December if the team advances. Previous robotics experience is not required.

### SCEN 1500 Interdisciplinary Science (3)

#### SCEN 1890 Service Learning (0-1)

Students complete a service activity in the community in conjunction with the content of a three-credit co-requisite course. Course may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

#### SCEN 1891 Service Learning (0-1)

Students complete a service activity in the community in conjunction with the content of a three-credit co-requisite course. Course may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

#### SCEN 1940 Transfer Coursework (0-20)

Transfer Coursework at the 1000 level. Department approval may be required.

**Maximum Hours:** 99

#### SCEN 1945 Transfer Coursework Lab (0-20)

Transfer Coursework at the 1000 level. Department approval may be required.

**Maximum Hours:** 99

### SCEN 2030 Anatomy I (3)

The purpose of this course is to aid students in acquiring an understanding of, and new appreciation for, the structures of the human body and their relationships using a regional approach. Early in the course, students are introduced to structural, directional, and regional terminology. Students are introduced to structures at the tissue level, differentiating between cell structure and function. Using this foundation, the curriculum guides students through segments of the body, primarily focusing on the skeletal, muscular, nervous, and cardiovascular systems while introducing basic anatomy of visceral organs.

**Prerequisite(s):** CELL 1010 or EBIO 1010.

### SCEN 2035 Anatomy I - Lab (1)

This Anatomy Lab course is designed to concurrently apply anatomical concepts to the field of Exercise Science. Students are taught to perform detailed analyses of human motion, with consideration of lever systems, muscle architecture, recruitment patterns, and motor pathways. Students view common surgeries and rehabilitation techniques. Students are responsible for identifying structures on a variety of imaging mediums, including cross sectional scans, x-rays, and cadaveric images.

**Prerequisite(s):** (CELL 1010 or EBIO 1010) and SCEN 2030\*.

\* May be taken concurrently.

**SCEN 2040 Physiology I (3)**

The Physiology course is designed to examine body processes using an integrative view of body systems. Throughout the curriculum students are introduced to processes of muscle contraction, conduction of nervous tissue, and metabolism. Special attending is paid to the endocrine system and autonomic nervous system and their influences.

**Prerequisite(s):** CELL 1010 or EBIO 1010.

**SCEN 2045 Physiology I - Lab (3)**

The Physiology I Lab course focuses on pathway-based instruction and assessment and incorporates activities for students to perform via a virtual lab. Lab activities will focus on systemic and sub cellular pathways, including ion transport, reflexes, homeostatic feedback loops, and function of the special senses.

**Prerequisite(s):** CELL 1010 or EBIO 1010.

**SCEN 2070 Comm Sci.: STEM Enrichment (1)**

The Tulane Center for K-12 STEM Education has partnered with local middle schools to bring hands-on STEM activities into their school. Students will work with various graduate students who are leading these workshops at the Center's local partner schools and/or assisting with the planning and execution of the Center's events. Tulane students will learn middle school pedagogy (teaching techniques) as well as how to make learning science fun and exciting for our local students. SCEN 2070 satisfies the lower tier Service Learning graduation requirement. The service is a minimum of 40 hours over the course of the semester. Class time is not counted toward hours, and weekly attendance is required.

**SCEN 2660 Special Topics (1-3)**

Special Topics. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 2890 Service Learning (0-1)**

Students complete a service activity in the community in conjunction with the content of a three-credit co-requisite course. Course may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 2940 Transfer Coursework (0-20)**

Transfer Coursework at the 2000 level. Department approval may be required.

**Maximum Hours:** 99

**SCEN 2945 Transfer Coursework Lab (0-20)**

Transfer Coursework at the 2000 level. Department approval may be required.

**Maximum Hours:** 99

**SCEN 3010 Physical Dimen of Aging (3)**

This course is designed to introduce students to the physiological, behavioral, and cognitive changes associated with aging. In particular, we will focus on what physiological and structural changes are typical for an aging human body focusing on the brain, cardiovascular and musculoskeletal systems. We will also discuss what it means to become older within a community, what can a person expect during the aging process, and what kind of control a person has over his/her aging body. Course participants travel to local aging centers and continuing care facilities as part of the learning process.

**SCEN 3030 Anatomy & Physiology I (3)**

The course objectives are to learn the principal structure and physiology of the musculoskeletal, peripheral nervous, and central nervous systems and to be able to relate the structures to their functions. Prerequisite(s): EBIO 1010 and CELL 1010.

**Prerequisite(s):** EBIO 1010 or CELL 1010.

**SCEN 3035 Anatomy & Physiology I Lab (1)**

The first of two sequenced laboratory courses that complements SCEN 3030. Discussion of anatomical nomenclature, skeletal, muscular, peripheral and central nervous systems dissections. Dissection and exploration of human cadavers are an integral component of the laboratory experience.

Prerequisite(s): SCEN 3030\*. \* May be taken concurrently.

**Prerequisite(s):** SCEN 3030\*.

\* May be taken concurrently.

**SCEN 3040 Anatomy & Physiology II (3)**

The second of two sequenced courses in human anatomy and physiology. The second sequenced course explores special senses, the respiratory, cardiovascular, lymphatic and reproductive systems. Prerequisite(s): SCEN 3030.

**Prerequisite(s):** SCEN 3030.

**SCEN 3045 Anatomy & Physiology Lab II (1)**

The second of two sequenced laboratory courses that complements SCEN 3040. Systems covered included: autonomic nervous system, special senses, endocrine, cardiovascular, respiratory, digestive, urinary and reproductive systems. Dissection and exploration of human cadavers are an integral component of the laboratory experience. Prerequisite(s): SCEN 3035. Corequisite(s): SCEN 3040.

**Prerequisite(s):** SCEN 3035.

**Corequisite(s):** SCEN 3040.

**SCEN 3050 Biotech Entrepreneurship (3)**

SCEN 3050 provides a multi-disciplinary exploration of "real world" topics that science and engineering researchers must consider when translating their innovations from the laboratory to the medical arena. The focus is on such processes as identifying and validating a need, brainstorming and selecting a concept, developing an intellectual property strategy, determining funding sources, and evaluating the reimbursement and regulatory pathway. The goal is to provide students with critical information pertinent to the translation of their idea or invention from original conception in the university laboratory all the way to the healthcare marketplace where it may impact patients.

**SCEN 3660 Special Topics (1-3)**

Special Topics. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 3880 Writing Intensive (0)**

Course to be attached to regular courses that incorporate a writing component within the regular course. Register within department.

**SCEN 3890 Service Learning (0-1)**

Students complete a service activity in the community in conjunction with the content of a three-credit co-requisite course. Course may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 3940 Transfer Coursework (3)**

Transfer Coursework at the 3000 level. Department approval may be required.

**Maximum Hours:** 99

**SCEN 3945 Transfer Coursework Lab (0-20)**

Transfer Coursework Lab. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 4050 Introduction to Histopathology (3)**

The primary goal of Introduction to Histopathology is to establish a foundation of knowledge that will allow the student to relate detailed cellular alterations to overall disease processes. The course will provide a solid foundation in histology and cell biology with respect to modern medicine and will introduce students to the cellular mechanisms of disease processes. Some major tissue groups will be covered. Part I brings together histology and general pathology within the context of the basic tissues. Part II presents several organ systems grouped by their most relevant function for the purpose of integration. Students will be expected to learn the knowledge by attending lectures, lab sessions, case discussions. Students are expected to work through set tasks during lab sessions and case discussions that are designed to improve their understanding of tissue organization and function, and to promote their problem-solving skills. Prerequisite(s): CELL 4110.

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**SCEN 4110 Basic Medical Biochemistry (3)**

Basic Medical Biochemistry aims to establish the student's biochemical competency for admission to medical school and success in the first-year medical curriculum. The course focuses on topics, mechanisms, and analyses that are most relevant to human health and disease, including biomolecule structure and function, gene regulation, and metabolism in cancer, diabetes, and heart disease. The instructors are faculty in the Tulane Medical School, and classes are held on the medical campus. Course topics are drawn from those addressed by Tulane medical students. Instructional methods include those currently employed in the Tulane Medical School, such as the flipped classroom and team-based learning. Students will be provided an array of learning aids, including instructional videos. Pre-requisite: CHEM 2410 and junior standing or instructor approval. Course does not count towards major requirements in CMB, BIOC, CHEM, or CHE. Credit not given for this course and CELL 4010/6010, CHEM 3830, CENG 4450 or CENG 4460.

**Prerequisite(s):** CHEM 2410 and (CELL 2050 or EBIO 2070).

**SCEN 4570 Internship (1-3)**

An experiential learning course in which students will work with community partners in a variety of settings (health, environmental, education, etc.). In-class sessions and assignments will consist of discussions, readings, and written and oral reflections to place the volunteer service into the greater academic context. Fulfills the second tier service requirement. Courses may be repeated up to unlimited credit hours. Corequisite(s): SRVC 4890.

**Maximum Hours:** 99

**SCEN 4580 Internship (1-3)**

An experiential learning process coupled with pertinent academic course work. Open only to juniors and seniors in good standing. Registration is completed in the academic department sponsoring the internship.

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An experiential learning process coupled with pertinent academic course work. Open only to juniors and seniors in good standing. Registration is completed in the academic department sponsoring the internship.

**SCEN 4660 Special Topics (1-3)**

Special Topics. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 4890 Service Learning (0-1)**

Students complete a service activity in the community in conjunction with the content of a three-credit co-requisite course. Course may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 4910 Independent Study (1-3)**

Laboratory or library research under direction of a faculty member.

**Course Limit:** 1

**Maximum Hours:** 6

**SCEN 4920 Independent Study (1-3)**

**Course Limit:** 1

**Maximum Hours:** 6

**SCEN 4940 Transfer Coursework (3)**

Transfer coursework at the 4000 level. Departmental approval required.

**Maximum Hours:** 99

**SCEN 4945 Transfer Coursework Lab (0-20)**

Transfer Coursework Lab. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 4950 Special Projects in SCEN (1-3)**

Students will work on their own project in consultation with a faculty member.

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Students will work on their own project in consultation with a faculty member.

**SCEN 5380 Study Abroad (1-20)**

Semester Abroad. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 5390 Study Abroad (1-20)**

Semester Abroad. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 6000 Entrepreneurship Eng & Biosci (3)**

This course focuses on taking graduate and senior capstone engineering and bioscience research projects to a commercial stage. Not only does one need to take the research projects to an advanced engineering/bioscience stage in order to be commercialized, one needs to develop a competitive business plan, an intellectual property position, and a sustainable competitive advantage. Additionally, this course explores the major economic and technological developments that are shaping the world, how to develop and sustain a competitive bioengineering or biotech start-up firm, how to write a competitive business plan and the proper interaction with venture capitalists, lawyers and investment bankers through the entire business cycle. All through this process, the importance of ethics is continually studied, stressed and examined. Guest speakers are incorporated throughout the semester including a venture capitalist, a business ethicist, startup attorney, investment banker and several bioscience and biomedical engineering entrepreneurs.

**SCEN 6010 Physical Dimen of Aging (3)**

This course is designed to introduce students to the physiological, behavioral, and cognitive changes associated with aging. In particular, we will focus on what physiological and structural changes are typical for an aging human body focusing on the brain, cardiovascular and musculoskeletal systems. We will also discuss what it means to become older within a community, what can a person expect during the aging process, and what kind of control a person has over his/her aging body. Course participants travel to local aging centers and continuing care facilities as part of the learning process.

Prerequisite(s): CELL 1010 and EBIO 1010.

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**SCEN 6030 Anatomy & Physiology I (3)**

The course objectives are to learn to identify the principal components of the musculoskeletal, peripheral nervous, and central nervous systems and to be able to relate the structures and their functions. (Graduate section of SCEN 3030.)

**SCEN 6035 Anatomy & Physiology I Lab (1)**

The first of two sequenced laboratory courses that complements SCEN 6030. Discussion of anatomical nomenclature, skeletal, muscular, peripheral and central nervous systems dissections. Dissection and exploration of human cadavers are an integral component of the laboratory experience. (Graduate section of SCEN 3035.) Prerequisite(s): SCEN 6030\*. \* May be taken concurrently.

Prerequisite(s): SCEN 6030\*.

\* May be taken concurrently.

**SCEN 6040 Anatomy & Physiology II (3)**

The second of two sequenced courses intended to address human anatomy and physiology. This course explores the respiratory, cardiovascular, lymphatic and reproductive systems. (Graduate section of SCEN 3040.) Prerequisite(s): SCEN 6030.

Prerequisite(s): SCEN 6030.

**SCEN 6045 Anatomy and Physiology II Lab (1)**

The second of two sequenced laboratory courses that complements SCEN 6040. Systems covered included: autonomic nervous system, special senses, endocrine, cardiovascular, respiratory, digestive, urinary and reproductive systems. Dissection and exploration of human cadavers are an integral component of the laboratory experience. (Graduate section of SCEN 3045.) Prerequisite(s): SCEN 6035. Corequisite(s): SCEN 6040.

Prerequisite(s): SCEN 6035.

Corequisite(s): SCEN 6040.

**SCEN 6060 Applied Innovation (3)**

Given a vetted product that solves a real problem, why do some young projects and companies fail, while others thrive and achieve the commercial or societal impact necessary to make a real difference in the world? This course reviews the foundational aspects of applied scientific and engineering innovation – that is, translation of an idea or concept into a valid application and product – then addresses those rarely taught aspects of development that frequently mean the difference between success or failure in an early stage venture. Topics addressed revolve around opportunity selection and development, leadership of innovative efforts, team development and the daily operational elements necessary to successfully developing and executing a plan. While all students may not become entrepreneurs, most will at some point in their career benefit from a thorough understanding of how to lead and manage teams, and will use the concepts, frameworks and practical tools provided by the course.

**SCEN 6080 Tech Invent & Commercialization (3)**

Technology Invention; Commercialization; models innovation and entrepreneurial theory; practices from across a range of commercial sizes; from small startup companies to entrepreneurial units within large, established companies. The twin poles of theory and practice are balanced through classroom lectures and experiential training. Weekly lectures furnish students with effective and portable theoretical frameworks for identifying, selecting and executing opportunities for technological innovations in healthcare, energy, water and the environment. In the experiential training, students will apply their classroom learning to targeted, formal innovation and entrepreneurship competitions; including regional and national design contests, technology challenges, and business model competitions. Completion of this course will supply students with intellectual groundwork and practical experience in advancing inventive technological ideas towards commercialization and ultimately public benefit.

**SCEN 6660 Special Topics (1-3)**

Special Topics. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99

**SCEN 6940 Transfer Coursework (0-20)**

Transfer coursework at the 6000 level. Departmental approval required.

**Maximum Hours:** 99

**SCEN 6950 Special Projects in SCEN (1-3)****SCEN 7010 Bioinnovation Internship (6)**

SCEN 7010 provides 6 credit hours for Bioinnovation PhD Fellows upon completion of their 12-week summer internship with the Food and Drug Administration in Washington, DC.

**SCEN 7020 Bioinnovation Research (3)**

SCEN 7020 provides 3 credit hours/semester to Bioinnovation fellows. Students in the Bioinnovation PhD Program are eligible to register for this course once they have completed all didactic course requirements.

**SCEN 7240 College Teaching Pedagogy (3)**

The objective of Teaching Pedagogy is to provide a structured learning experience for doctoral students to facilitate their preparation to teach at the collegiate level and to increase their competitiveness on the job market.

**SCEN 7500 Intro to Scientific Writing (3)**

This course in English Composition is open to all students in PhD programs in the School of Science and Engineering. The course will focus on basic writing skills and skills needed in scientific writing and grant preparation.

**SCEN 7650 ESL: Speaking Skills (1-2)****SCEN 7660 ESL Writing Skills (3)****SCEN 7940 Transfer Coursework (0-20)**

Transfer coursework at the 7000 level. Departmental approval required.

**Maximum Hours:** 99

**SCEN 9990 Dissertation Research (3)**

Research toward completion of a doctoral degree. Courses may be repeated up to unlimited credit hours.

**Maximum Hours:** 99