ENGR 131. Elementary Computer Programming. 3 Units.
Students will learn the fundamentals of computer programming and algorithmic problem solving. Concepts are illustrated using a wide range of examples from engineering, science, and other disciplines. Students learn how to create, debug, and test computer programs, and how to develop algorithmic solution to problems and write programs that implement those solutions. Matlab is the primary programming language used in this course, but other languages may be introduced or used throughout. Counts for CAS Quantitative Reasoning Requirement.

ENGR 145. Chemistry of Materials. 4 Units.
Application of fundamental chemistry principles to materials. Emphasis is on bonding and how this relates to the structure and properties in metals, ceramics, polymers and electronic materials. Application of chemistry principles to develop an understanding of how to synthesize materials. Prereq: CHEM 111 or equivalent.

ENGR 200. Statics and Strength of Materials. 3 Units.
An introduction to the analysis, behavior and design of mechanical/structural systems. Course topics include: concepts of equilibrium; geometric properties and distributed forces; stress, strain and mechanical properties of materials; and, linear elastic behavior of elements. Prereq: PHYS 121.

ENGR 200T. Statics and Strength of Materials (in Tianjin, China). 3 Units.
An introduction to the analysis, behavior and design of mechanical/structural systems. Course topics include: concepts of equilibrium; geometric properties and distributed forces; stress, strain and mechanical properties of materials; and, linear elastic behavior of elements. Prereq: PHYS 121.

ENGR 210. Introduction to Circuits and Instrumentation. 4 Units.

ENGR 225. Thermodynamics, Fluid Dynamics, Heat and Mass Transfer. 4 Units.

ENGR 225B. Thermodynamics, Fluid Mechanics, Heat and Mass Transfer (abroad). 4 Units.
Elementary thermodynamic concepts: first and second laws, and equilibrium. Basic fluid dynamics, heat transfer, and mass transfer: microscopic and macroscopic perspectives. The course is taught as a faculty-led study abroad course, and engineering applications are discussed in the context of regional issues specific to the host country. Prereq: CHEM 111, ENGR 145, and PHYS 121. Coreq: MATH 223.

ENGR 350U. International Project Field Work: Uganda, Global Health. 1 Unit.
Field trip to Uganda for design teams associated with ENGR 397/ANTH 303 and the Global Health Design Collaborative. Participation by instructor consent. A course fee will be assessed to cover travel and on-the-ground expenses. Offered as ENGR 350U and ANTH 300.

ENGR 397. Interdisciplinary Solutions to Global Health Issues. 3 Units.
This unique course brings together the expertise of engineers and social scientists to address global health issues through a combination of classroom-based learning and experiential learning through team-based design projects and field-based community assessments. Students will experience the process of engineering design by participating in teams organized around solutions to real-world health problems in the developing world. Methods from social sciences will be practiced and brought to bear in the process, including assessment of global health needs, and evaluation of success of interventions. Students will study and discuss current key issues in global health, and ethics surrounding health care, disparity, methods of intervention, and develop skills in how to define and frame problems and communicate effectively across disciplines. The course is organized around ongoing projects that seek to design technical solutions to global health issues, with a focus on Uganda. The teams will also work and learn with students and faculty of Biomedical Engineering and Social Sciences at Makerere University of Kampala (MUK), Uganda. Examples of interactions with MUK will include discussion of common readings, peer-review, and joint planning, implementation, and review of fieldwork. Students enrolled in ANTH 303/ ENGR 397 are eligible to travel to Uganda to participate in project activities over Spring Break. Travelers must be enrolled in ENGR 350U. This course is an approved SAGES Departmental Seminar. A student in the Case School of Engineering may use this course to meet an Engineering Core Breadth requirement, either in place of ENGL 398 and ENGR 398, or as a Social Science course (ANTH 303 cross-list). No student may count the course to satisfy both of these requirements. Offered as ANTH 303 and ENGR 397. Counts as SAGES Departmental Seminar. Counts for CAS Global & Cultural Diversity Requirement. Prereq: Passing letter grade in a first year seminar in FSCC, FSSO, FSSY, FSNA, FSCS or FSTS.

ENGR 398. Professional Communication for Engineers. 1 Unit.
Students will attend lectures on global, economic, environmental, and societal issues in engineering, which will be the basis for class discussions, written assignments and oral presentations in ENGL 398. Recommended preparation: ENGL 150 or FSCC 100 or equivalent and concurrent enrollment in ENGL 398 (ENGL 398 and ENGR 398 together form an approved SAGES departmental seminar). Counts as SAGES Departmental Seminar.

ENGR 400C. Graduate Cooperative Education. 0 Unit.
An academic opportunity designed for graduate students to enhance their classroom, laboratory, and research learning through participation and experience in various organizational/industrial environments where theory is applied to practice. Graduate Cooperative Education experiences may be integrated with the student's thesis or research project areas, or be solely for the purpose of gaining professional experience related to the student's major field of study. Registration in this course will serve to maintain full-time student status for the period of time that the student is on a co-op assignment.
ENGR 401C. Graduate Cooperative Education. 0 Unit.
An academic opportunity designed for graduate students to enhance their classroom, laboratory, and research learning through participation and experience in various organizational/industrial environments where theory is applied to practice. Graduate Cooperative Education experiences may be integrated with the student’s thesis or research project areas, or be solely for the purpose of gaining professional experience related to the student’s major field of study. Registration in this course will serve to maintain full-time student status for the period of time that the student is on a co-op assignment. Prereq: ENGR 400C.

ENGR 480. Professional Development for Graduate Students. 2 Units.
The course aims (1) to provide students with an appreciation of the linkage of business and management issues to successful (and sometimes not) R&D and commercialization in industry; (2) to develop a common language around innovation and an entrepreneurial mindset; and (3) to develop skills associated with the development of compelling value propositions with frequent practice via writing and speaking. Concepts from project management, finance, strategy and entrepreneurship will be introduced via readings, discussions and occasional case studies, and proposals emphasizing needs-based innovation. This course has emerged based on discussions with industry over the past decade regarding expectations of M.S. and Ph.D. graduates.

ENGR 484. International Engineering Entrepreneurship. 3 Units.
Technological innovation increasingly involves global interactions. This course addresses the entrepreneurial aspects of innovation within an international context, with focuses on global cultural and political issues, business plans and communication in multi-cultural settings, ethics, and international aspects of intellectual property. This course is taught mainly in an intensive 2-week session in a foreign country, but with several class sessions on campus before departure.