247. Introduction to Phonetic Principles
Second semester. Three credits. Prerequisite: COMS 211, Robb
The analysis of speech through the application of phonetic theory.

248. Introduction to Audiology
Second semester. Three credits. Prerequisite: COMS 250.
An Introduction to the nature, causation, assessment and management of hearing impairment and the principles and techniques of public school conservation programs.

249. Introduction to Aural Rehabilitation
First semester. Three credits. Prerequisite: COMS 248. Maxon
An introduction to the effects of hearing impairment on communication. Communication strategies for adults and children with impaired hearing are discussed.

250. Audition
First semester. Three credits. Cohen
The response to acoustic stimuli including methodology and instrumentation.

252. Introduction to Language Pathologies
First semester. Three credits. Prerequisite: COMS 202.
A review of the development, measurement, and function of language and a survey of language disorders and their causes.

293. Foreign Study
Either or both semesters. Credits and hours by arrangement. May be repeated for credit. Consent of Department Head required, normally granted prior to the student’s departure. May count toward the major with consent of the advisor.
Special topics taken in foreign study program.

296W. Senior Thesis
Either semester. Credits and hours by arrangement. Open only with consent of instructor.
Preparation of a thesis and its presentation to the department.

297. Variable Topics
Either semester. Three credits. With a change in topic, may be repeated for credit. Prerequisites, recommended preparation, and recommended preparation vary.

298. Special Topics
Either semester. Credits and hours by arrangement. With a change in content, may be repeated for credit. Prerequisites, recommended preparation, and recommended preparation vary.

299. Independent Study
Either or both semesters. Credits and hours by arrangement. Open only with consent of instructor. With a change of content, may be repeated for credit. The course, for superior students, includes independent reading, periodic conferences, and such other work as desired by the instructor.

Comparative Literary and Cultural Studies (CLCS)

Program Chair: Associate Professor Lucy McNiece
Office: Room 242, J.H. Arjona Building

201. Comparative Literature
Either semester. Three credits. This course may be repeated for credit with a change of topic.
Lectures and discussion sessions devoted to the study of major literary questions which go beyond national boundaries. (No foreign language required.)

203. Comparative Studies in Cultural History
Either semester. Three credits. This course may be repeated for credit with a change of topic.
The comparative study of cultural movements in literature and the arts throughout history. The course will explore different areas of cultural practice — e.g., social, literary, political, aesthetic, anthropological, — with an eye as to how they are shaped, and in turn shape, dominant institutions and values. Sample topics include: World War I and the emergence of Modernism; European Fascisms; Christian, Jewish, and Muslim culture in Medieval Spain; photography and the Colonial Encounter, etc. May be repeated with change of topic.

Computer Science and Engineering (CSE)

Interim Head of Department: Professor Reda Ammar
Department Office: Room 460, United Technologies Engineering Building

For major requirements, see the School of Engineering section of this Catalog.

(Courses are labeled with the number of the course, followed by the equivalent course number in the School of Engineering. Courses in parentheses are listed in the adjacent column for reference only, and are not part of the major requirements.)

101C. Computers in Modern Society
Second semester. Three credits. Two class periods and two 1-hour program design periods. Open to credit to students who have passed CSE 110C or CSE 130C. Students who anticipate extensive study or use of computers in their future work should take CSE 110C and 111, or CSE 130 rather than this course. Ungar
Introduction to computer applications in the humanities, social sciences, business, and other fields. Influence of the computer on modern society and technology. Elements of computer usage in the solution of numeric and non-numeric problems including introduction to programming methods.

110C. Introduction to Numerical Computation
Either semester. Three credits. Two 1-hour class periods and two 1-hour program design periods. Required preparation: MATH 110Q or MATH 113Q or MATH 115Q, which may be taken concurrently. Not open for credit to students who have passed CSE 110C or CSE 130C. Students who anticipate extensive study or use of computers in their future work should take CSE 110C and 111, or CSE 130 rather than this course. Ungar
Introduction to computational aspects of the computer. Use of computer programs to study and analyze problems. Discussion of the relationship between the design of algorithms and their implementation. Analysis of computational errors in numerical calculations. Methods for the design, implementation, verification and documentation of programs using current programming languages.

120W. Logic Design Laboratory
Either semester. Prerequisites: CSE 111 and one 1-hour laboratory course, which may be taken concurrently. Not open for credit to students who have passed CSE 110C or CSE 130C. This is a very demanding course. Consent of the advisor is required of students who have had previous computer programming experience and have a high level of motivation for using computers in future work.
Not open for credit to students who have passed CSE 110C or CSE 111. Either CSE 130C or CSE 110C – 111 is required of students planning on taking advanced CSE courses. Ungar
Design of algorithms to solve numerical and non-numerical problems. Top-down design techniques and structured programming. Investigation and selection on data organizations for efficient problem solutions. Analysis of computational errors in numerical calculations. Methods for the design, implementation, verification and documentation of programs using current programming languages.

201. Computer Architecture
Either semester. Three credits. Prerequisites: CSE 111 or CSE 130. Not open to students who have credit for CSE 207 or CSE 241. Open to sophomores. Formal models of computation, such as finite state automata, pushdown automata, and Turing machines, and their corresponding elements in formal languages (regular, context-free, recursively enumerable). The complexity hierarchy. Church’s thesis and undecidability. NP completeness. Theoretical basis of language design and compiler construction.

207. Computer Science
Either semester. Three credits. Three class periods and one 1-hour discussion period. Required preparation: CSE 110C or CSE 130C. Open to sophomores. Ammar, Barker, McCartney
Representation of digital information. Introduction to the analysis and design of combinational and sequential logic networks using Boolean algebra and register transfer techniques. Structure and operation of digital systems and computers. Introduction to the programming at the machine and assembler level. Design projects.

208W. Logic Design Laboratory
Either semester. Prerequisites: CSE 111, either CSE 241 or CSE 243, and one of STAT 220Q, 224Q, 230Q or MATH 231Q and MATH 227Q. Not open for credit to students who have passed CSE 110C or CSE 130C. This is a very demanding course. Consent of the advisor is required of students who have had previous computer programming experience and have a high level of motivation for using computers in future work.
Open to sophomores. Barker
Design and evaluation of combinational and sequential logic circuits. Debugging techniques. Use of computer facilities for circuit simulation, CAD and report preparation and presentation.

221. Probabilistic Performance Analysis of Computer Systems
Either semester. Three credits. Prerequisite: CSE 111, either CSE 241 or CSE 243, and one of STAT 220Q, 224Q, 230Q or MATH 231Q and MATH 227Q. Ammar, Liptsy
Introduction to the probabilistic techniques which can be used to represent random processes in computer systems. Markov processes, generating functions and their application to performance analysis. Models which can be used to describe the probabilistic performance of digital systems.

228. Parallel Systems
Either semester. Three credits. Prerequisite: CSE 254 and CSE 241. Not open for credit to students who have passed CSE 252. Greenshields
An Introduction to parallel systems. Fundamentals

230. Introduction to Software Engineering  
Either semester. Three credits. Three class periods and one problem session. Prerequisite: CSE 111 or CSE 130. Not open for credit to students who have passed CS 250. Open to sophomores. Demurjian, Peters  
Software engineering concepts including the software life cycle and other software-development process models. Specification techniques, design methodologies, performance analysis, and verification techniques. Team-oriented software design and development, and project management techniques. Introduction to a modern programming language and the associated design and debugging tools. Homework and laboratory projects that emphasize design and the use/features of a modern programming language.

233. Programming Languages  
Either semester. Three credits. Prerequisite: CSE 111 or CSE 130.  
The study of programming language features and programming paradigms. Data types, control, run-time environments, and semantics. Examples of procedural, functional, logical, and object-oriented-orientated. Features used for parallel and distributed processing. Classic and current programming languages and environments.

237. Theory of Computation  
Either semester. Three credits. Prerequisite: CSE 259 and either CSE 254 or MATH 214.  
Formal models of computation, such as finite state automata, pushdown automata, and Turing machines, and their corresponding elements in formal languages (regular, context-free, recursively enumerable). The complexity hierarchy. Church’s thesis and undecidability. NP completeness. Theoretical basis of design and compiler construction.

240. Intermediate Computer Systems Laboratory  
Either semester. Three credits. One 1-hour lecture and 4 hours of Laboratory. Prerequisite: CSE 111 or consent of instructor and CSE 241 which may be taken concurrently. Not open for credit to students who have passed CS 253. Greenshields, Lowell  
A Chap course on programming of microprocessor type systems. Topics covered include I/O ports, I/O devices and controllers, DMA channels, priority interrupts, networking, multithreading, Design projects.

241. Computer Organization  
Either semester. Three credits. Prerequisite: CSE 207, and CSE 208W which may be taken concurrently. Ammar, Peters  
Fundamentals of computer organization. Instruction sets and addressing modes. CPU design; the control path and microprogramming; FSM design; the data path; integer arithmetic; buses; the memory hierarchy; the I/O subsystem; RISC architectures; pipelining; basic performance analysis; fundamentals of networking. Lab activities include (but are not limited to): basic assembly language programming on a CICS and RICS processor; processor benchmarking; use of cache; polled, interrupt driven and DMA I/O files; optimizing code.

244. Programming Language Translation  
Either semester. Three credits. Prerequisite: CSE 254 or MATH 214Q and CSE 230 or CS 250. Crandall, Demurjian  
Introduction to the formal definition of programming language syntax and semantics. Design and realization of programming language processing systems such as assemblers, compilers, and interpreters.

245. Computer Networks and Data Communication  
Semester by arrangement. Three credits. Prerequisite: CSE 221 which may be taken concurrently. Ammar, Crandall, Ting  
Introduction to computer networks and data communications. Network types, components and topology, protocol architecture, routing algorithms, and performance. Case studies including LAN and other architectures.

252. Digital Systems Design  
Either semester. Three credits. Prerequisite: CSE 243 or both CSE 240 and CSE 241. Not open to students who have credit for EE 252. Also offered as EE 252. Greenfield  
Design and evaluation of control and data structures for digital systems. Hardware design languages are used to describe and design alternative register transfer level architectures and control units with a micro-programming emphasis. Consideration of computer architecture, memories, digital interfacing timing and synchronization, and microprocessor systems.

254. Introduction to Discrete Systems  
Either semester. Three credits. Prerequisite: CSE 111 or CSE 130C or consent of instructor. Not open for credit to students who have passed MATH 214Q. Open to sophomores. Roulier  
Mathematical methods for characterizing and analyzing discrete systems. Modern algebraic concepts, logic theory, set theory, grammars and formal languages, and graph theory. Application to the analysis of computer systems and computational structures.

255. Principles of Data Bases  
Either semester. Three credits. Prerequisite: CSE 254 or MATH 214. Required preparation: CSE 230 or CS 250. Demurjian, Shin  
Fundamentals of data base design and data indexing techniques. Hierarchical, network, and relational data models. Data base design theory. Query languages, their implementation and optimization. Data base security and concurrent data base operations.

(Also offered as EE 257.) Either semester. Three credits. Prerequisite: Either CSE 110C or CSE 130C or ENGR 150C and MATH 210Q and MATH 211Q, or consent of instructor. Not open for credit to students who have passed EE 257. Peters, Roulier  
An Introduction to the numerical algorithms fundamental to scientific computation. Equation solving, function approximation, integration, difference and differential equations, special computer techniques.

Emphasis is placed on efficient use of computers to optimize speed and accuracy in numerical computations. Extensive digital computer usage for algorithm verification.

258. Operating Systems  
Either semester. Three credits. Prerequisite: CSE 240. Required preparation: CSE 230 or CSE 243 which may be taken concurrently. Lowell  
Introduction to the theory, design, and implementation of software systems to support the management of computing resources. Topics include the synchronization of concurrent processes, memory management, processor management, scheduling, device management, file systems, and protection.

259. Algorithms and Complexity  
Either semester. Three credits. Two class periods and two hours of Laboratory. Prerequisite: CSE 111 and CSE 130C. Recommended preparation: CSE 254 or MATH 214. Peters  
Theoretical aspects of computer science. Equivalent models of computation, the role of mathematical induction, graph algorithms, complexity theory, computability, use of standard algorithmic techniques—such as divide-and-conquer. Investigation of novel examples from fields such as graphics, computational geometry, and artificial intelligence. Emphasis in lab will be on analysis of supplied software examples, although some original software development will also occur.

261. Digital Hardware Laboratory  
Advanced combinational and sequential circuit design and implementation using random logic and microprocessor based system. Hardware and software interface to the basic system. Signal communication, user program loading and execution, Microcontrollers—familiarization and inclusion in design.

262. Software Engineering Laboratory  
Second semester. Three credits. Four program design periods. Prerequisite: CSE 250 or CSE 230. Not open for credit to students who have passed CS 251. Demurjian, Peters  
A major software design project addresses specification through delivery phases of the lifecycle. The major focus of the course is utilization and application of concepts from CSE 230 to a straight forward semester long project. This allows the student to explore programming-in-the-large with an emphasis on techniques for teamwork, walk through, design, documentation, implementation, and debugging. Data structures and algorithm alternatives for the design and implementation phases of the lifecycle are also stressed. Formal design presentations are required by all students.

263. Networking and Distributed Systems Laboratory  
Either semester. Three credits. Four hour laboratory. Prerequisite: CSE 228, CSE 243, CSE 245, and either CSE 230 or CSE 233. Greenshields  
Software laboratory that explores selected issues in networking and distributed systems. Topics include: Berkeley sockets; TCP and IP; atm apis; latency and bandwidth; performance models; performance evaluation of different network fabrics; MPI; simple CORBA; performance characteristics of MPI, Java, RMI, and CORBA; implementation and evaluation of a client-server system.

265. Independent Design Laboratory  
Either semester. Three credits. Prerequisite: Either CSE 230 or CSE 250. May be taken twice for credit. In-
267W. Software Laboratory on Large Computers
Semester by arrangement. Three credits. Two class periods and one 2-hour program design period. Prerequisite: CSE 240. Lovell
Investigation of instruction sets, internal data representations, interrupt systems, and the input/output system of a large computer available in the Computer Center. Assembler language, related job control language, supervision conventions, linkage methods, data storage techniques and access methods. Design projects.

268. Microprocessor Laboratory
First semester. Three credits. One 4-hour laboratory period. Prerequisite: CSE 208W, CSE 240, and CSE 241. Recommended preparation: CSE 252. Sholl
The design of microcomputer systems, including both hardware and software, for solving application problems. Hardware and software design and implementation techniques for interfacing microcomputers to other systems. Use of modern microcomputer software/hardware development facilities. Projects to design and apply microcomputer systems.

269. Computer Science Design Laboratory
Either semester. Three credits. Three laboratory periods. Prerequisite: Announced separately for each course. With a change in content this course may be repeated for credit.
Design and implementation of complex software and/or hardware systems to solve problems posed by either student groups or the instructor.

Semester by arrangement. Three credits. Prerequisite: Either CSE 111 or 130C and MATH 227Q or 215Q and MATH 210Q or consent of instructor. Not open for credit to students who have passed MATH 255. Peters, Roulier
Representation of two- and three-dimensional data, internal representation of data structures, transformations, mapping of data to graphics screen, graphics hardware. Programming projects are assigned.

280. Digital Design Laboratory
Either semester. Three credits. Four hours of laboratory. Prerequisite: CSE/EE 252 which may be taken concurrently. Not open for credit to students who have credit for EE 280. Also offered as EE 280. Digital designing with PLA and FPGA, A/D and D/A converter, floating point processing. ALU, design, synchronous and asynchronous controllers, control path; bus master; bus slave; memory interface; I/O interface; logic circuits analysis, testing, and troubleshooting; PBC: design and manufacturing.

282. Artificial Intelligence
First semester. Three credits. Prerequisite: CSE 254. Required preparation: CSE 230 or CS 250. McCartney
Design and implementation of intelligent systems, in areas such as natural language processing, expert reasoning, planning, robotics, problem solving and learning. Students will design their own versions of “classic” AI problems, and complete one substantial design project. Programming will be done primarily in Lisp, which will be covered briefly at the beginning of the course.

290. Computer and Electrical Engineering Design I
Either semester. Two credits. This course is offered in the semester before CSE/EE 291. Also offered as EE 290. Discussion of the design process; project statement, specifications of design, planning scheduling and division of responsibility, ethics in engineering design, safety, environmental considerations, economic constraints, liability, manufacturing, and marketing. Projects are carried out using a team-based approach. Selection and analysis of a design project to be undertaken in CSE/EE 291 is carried out. Written progress reports, a proposal, an interim report, a final report, and oral presentations are required.

291. Computer and Electrical Engineering Design II
Either semester. Three credits. Prerequisite: CSE/EE 291. Also offered as EE 291.
Design of a device, circuit, system, process, or algorithm. Team solution to an engineering design problem formulated in CSE/EE 290, from the first concepts through evaluation and documentation. Written progress reports, a final report, and oral presentations are required.

298. Special Topics in Computer Science and Engineering
Semester and credits by arrangement. Prerequisite: Announced separately for each course. With a change in content, this course may be repeated for credit.
Classroom course in special topics as announced in advance for each semester.

299. Independent Study in Computer Science and Engineering
Semester by arrangement. Credits by arrangement, not to exceed 4 in any semester. Prerequisite: Consent of instructor and department head.

Dramatic Arts (DRAM)
Head of Department: Professor Gary M. English
Department Office: Room 242, Drama – Music Building
For major requirements, see the School of Fine Arts Catalog.

101. Introduction to the Theatre
Either semester. Three credits.
Analysis of the function of the theatre artists and their contributions to the modern theatre.

107. Theatre Production Studio
Either semester. Two credits. Two 2-hour studio periods. May be repeated to a maximum of eight credits. Franklin, McCaw
Elements of costume, lighting, management and stagecraft with application to departmental productions.

108. Fundamentals of Theatrical Design
Either semester. Three credits. Sabatine
Introduction to theories of theatrical design and their application.

110. Introduction to Film
Either semester. Three credits. Two class periods and one 2-hour laboratory period.
A basic study of film as both a means of communication and as an art form.

120. Production of the Speaking Voice
Either semester. Three credits. Stern
Study and practice in the development of an expressive, injury-free speaking voice capable of filling most performance spaces without amplification. Students concentrate on breathing technique, throat relaxation, resonance enhancement, and the use of variety in pitch and speaking rate. The course also integrates these technical voice skills with the principles of the inner acting process.

130. History of Drama I
First semester. Three credits. Not open for credit to students who have passed DRAM 180. McDermott
Dramatic literature and theatre history from Classical Greece through the Spanish Golden Age, including an examination of non-western theatre traditions, especially Japanese.

131. History of Drama II
Second semester. Three credits. Required preparation: DRAM 130. Not open for credit to students who have passed DRAM 181. McDermott, Molette
Dramatic literature and theatre history from the French Renaissance to Contemporary Theatre, including an examination of non-western theatre traditions, especially Chinese.

141. Oral Interpretation
Either semester. Three credits. Krasser
An intensive study of background and thought content of literary material and the development of techniques of oral interpretation.

143-144. Introduction to Acting
Both semesters. Three credits each semester. Concurrent enrollment in DRAM 149-150 required for all acting majors.
First semester: Basic acting techniques, including improvisation and the use of the stage environment. Second semester: continuation of basic techniques with emphasis on the presentation of scenes from contemporary plays.

149. Introduction to Movement for the Actor I
First semester. Three credits. Three 2-hour studio periods. Sabatine
Conditioning the body to increase stretch, strength, flexibility, and sensitivity. Exploration of movement concepts in space, time and energy values, and mind body and environment relationships.

150. Introduction to Movement for the Actor II
Second semester. Three credits. Three 2-hour studio periods. Sabatine
Continuation of Dramatic Arts 149. Emphasis on the organization of movement expression using essence theory of emotion, intentions, gestures and physical characterization through movement.

153. Theatre Jazz Dance I
Either semester. Three credits. Three 2-hour studio periods. Basic techniques, styles, and composition of jazz dance. Emphasis placed on technique.

154. Theatre Jazz Dance II
Continuation of Dramatic Arts 153.

163-164. Introduction to Directing
Both semesters. Three credits each semester. Required preparation: DRAM 143.
First semester: Emphasis on theory and play analysis from the director’s point of view. Second semester: Emphasis on practical staging experience, including casting techniques and rehearsal and performance methods.

180. Masterpieces of the Drama: Aeschylus to Shakespeare
Either semester. Three credits. Krasser
A study of masterpieces of Greek, Roman and Elizabethan drama with emphasis on analysis of form and content and attention to staging conventions.