592. **Special Problems.** 1-3 hrs. Supervised study in the area of computer engineering technology.

620. **Advanced Microcontroller Applications.** 3 hrs. Course covers advanced real-time programming and interfacing techniques. Applications will emphasize sensor interface circuits/systems for data acquisition, positioning, and control. Project management will include written proposals, budgets, verbal presentation, and project demonstrations.

626. **Digital Systems III.** 3 hrs. Prerequisite: CET 571. Fault detection in digital systems and fault tolerant computing.

627. **Advanced VLSI Design.** 4 hrs. Principles of CAD tools in design of digital VLSI systems: stick diagrams; design rules; and layout diagrams for CMOS technology. Design and implementation of custom VLSI integrated circuits.

692. **Special Problems.** 1-3 hrs. Supervised study in the area of computer engineering technology.

### Computer Science (CSC)


510L. **Operating Systems and Multiprocessing Laboratory.**


512. **Introduction to Artificial Intelligence.** 3 hrs. Prerequisite: CSC 308. Concepts and techniques of intelligent systems. Survey of research literature.


514L. **Software Design and Development Laboratory.** 1 hr. A laboratory designed to support CSC 514.

515. **Theory of Programming Languages.** 3 hrs. Prerequisite: CSC 308. Formal treatment of programming language translation and compiler design concepts.

521. **Relational Database Management Systems.** 3 hrs. Prerequisite: CSC 511. Theory of relational systems, comparison of relational and conventional systems, use of state-of-the-art relational systems such as Oracle.

524. **Software Engineering II.** 3 hrs. Prerequisite: CSC 514. Programming languages and software design, modular/object oriented design, team programming, human factors, case studies.

544. **Robotic Systems: Theory, Development, and Analysis.** 3 hrs. Prerequisite: MAT 326 or permission of instructor. Robotic system development, direct kinematics, the arm equation, workspace analysis, trajectory planning, and robotic programming methodologies.

585. **Information Retrieval in the U.K.-Theory.** 3 hrs. Prerequisite: Permission of instructor. Design of British information processing systems.

586. **Information Retrieval in the U.K.-Applications.** 3 hrs. Prerequisite: Permission of instructor. Design of information processing systems.

592. **Computer Science Problems I.** 3 hrs. Prerequisite: Solution of problems germane to a selected area of study.

616. **Automata, Computability, and Formal Languages.** 3 hrs. Prerequisite: CSC 415. Formal models of computation. Computability, complexity, languages.


623. **Analytical Models for Computer Systems.** 3 hrs. Prerequisite: CSC 410. Examination of the major models that have been used to study operating systems and the computer systems which they manage. Petri nets, data flow diagrams, and other models of parallel behavior. Fundamentals of queuing theory.

624. **Computer Communication Networks and Distributed Processing.** 3 hrs. Prerequisite: CSC 623. Study of networks of interacting computers. Problems, rationales, and possible solutions for both distributed processing and distributed databases. Major national and international communication protocols will be presented.

625. **Computer Graphics.** 3 hrs. Architecture of display systems, basic 2-D and 3-D mathematics, 3-D viewing and geometry, advanced surface mathematics, advanced architectures for raster and vector displays, hidden line and hidden surface problems, realistic imaging, software design for 3-D systems.

626. **Advanced Computer Architecture.** 3 hrs. Prerequisite: CSC 410. Introduction to various architectures and techniques which have been developed or are proposed in the literature. Pipelined architecture, dynamic system architecture, data flow architecture, array processing.

629. **Applied Combinatorics and Graph Theory.** 3 hrs. Prerequisite: CSC 616. Study of combinatorial and graphical techniques for complexity analysis including generating functions, recurrence relations, Polya's theory of counting, and NP complete problems.

630. **Parallel Programming Techniques.** 3 hrs. Prerequisites: CSC 306 and good knowledge of C and Unix. An application oriented course which will use a hands-on approach to teach methods for programming parallel applications on single and multi-cpu machines.

633. **Distributed Database Systems.** 3 hrs. Prerequisite: CSC 623. A consideration of the problems and opportunities inherent in distributed databases on a network computer system. Includes file allocation, directory systems, mutual exclusion, deadlock detection and prevention, synchronization, query optimization, and fault tolerance.

634. **Information Storage and Access.** 3 hrs. Prerequisites: CSC 411. Advanced data structures, file structures, and databases, with an emphasis on specialized problem areas. Access and maintenance issues.

636. **Modeling and Simulation.** 3 hrs. A study of the construction of models which simulate real systems. Includes probability and distribution theory, statistical estimation and inference, the use of random variates, and validation procedures. A simulation language is used for the solution of typical problems.

638. **Advanced Computer Algorithms.** 3 hrs. Prerequisite: CSC 413. Study of recent advances in algorithm design and analysis.


644. **Advanced Robotic Systems.** 3 hrs. To introduce students to advanced topics and prospective research areas in the field of robotics and its relation to AI, world modeling, and simulation.


690. **Seminar in Computer Science.** 1 hr.

691. **Topics in Computer Science.** 3 hrs. Special topics in computer science of current interest to faculty and students, e.g., robotics, neural networks, pattern recognition. May be repeated for credit at discretion of academic adviser.

695. **Directed Study.** 1-3 hrs. Individual study by a student on an area or problem approved by the student’s academic adviser.

697. **Independent Study and Research.** 1-9 hrs. arranged. Not to be counted as credit toward a degree. Students actively working on a thesis, consulting with the major professor, or using other resources of the university may enroll in this course. Students who are not in residence and are not enrolled in at least 3 hours of thesis but who are actively working on a thesis, consulting with the major professor, or using other resources of the university must enroll in this course for at least 3 hours each semester.

698. **Thesis.** 1-6 hrs. for a total of 6 hrs. Credit deferred until thesis is completed.

699. **Project.** 1-3 hrs. for a total of 3 hrs.


730. **Parallel and Distributed Computing.** 3 hrs. Fundamental concepts, techniques, and tools of parallel computer architectures, parallel algorithm design, performance and scalability, MPI and open MP programming, matrix computation, and solving linear system. Introduction to distributed computing.

733. **Advanced Distribution Database Systems.** 3 hrs. Advanced concept for modeling, designing, querying, and managing large databases, distributed databases, data warehousing and mining.

738. **Advanced Algorithms.** 3 hrs. Prerequisites: Knowledge of sequential algorithm design and analysis, NP-completeness, proficiency in high level language programming including pointer manipulation. Topics include models of parallel computation, general techniques, graph algorithms, expression evaluation, parallel sorting, parallel string matching, and P-completeness.


742. **Computational Geometric Modeling.** 3 hrs. Data structures and algorithms used in 2D and 3D computational/discrete geometry transforming several real-world into purely geometric ones and then solve them using modern computational geometry algorithms. Real-world problems will include robotics, graphics, and CAD/CAM.

### Computer Science (CS)

*(Offered only at Gulf Coast)*


508. **Programming Languages.** 3 hrs. Prerequisite: CS 307. Formal study of programming languages, organization of programming languages, runtime behavior of programs, interpretative languages, lexical analysis, and parsing.

511. **Relational Database Management Systems.** 3 hrs. Prerequisite: CS 307. Introduction to RDBMSs. Includes database design using the entity relationship model, relational model theory, relational algebra, and the implementation of applications using SQL and a state-of-the-art relational system such as Oracle.

514. Software Engineering I. 3 hrs. Prerequisite: CS 307. Overview of software developments, projects management, programming style, testing, debugging, and other topics.

521. Advanced Topics in Relational Database Management Systems. 3 hrs. Prerequisite: CS 511. A selection of advanced topics representing current trends in RDBMSs. Topics include, but are not restricted to, concurrency, backup and recovery, embedded database calls, distributed RDBMSs, and object oriented RDBMSs.

524. Software Engineering II. 3 hrs. Prerequisite: CS 414/514. Programming languages and software design, modular/object oriented design, team programming, human factors, case studies.


585. Information Retrieval in the U.K.-Theory. 3 hrs. Prerequisites: CSS 342 and permission of instructor. A study of British information processing systems.

586. Information Processing in the U.K.-Applications. 3 hrs. Prerequisites: CS 485 and permission of instructor. Design of information processing systems.


611. Artificial Neural Networks. 3 hrs. Prerequisite: CS 307. An in-depth study of the major neural network models. Emphasis is placed on architecture, implementation and applications. Students will use existing neural net software to design, implement, and test applications. Students will also test and implement a back propagation neural net.

616. Automata, Computability, and Formal Languages. 3 hrs. Prerequisite: CS 415 and formal models of computation, computability, complexity, and languages.

625. Computer Graphics. 3 hrs. Prerequisites: MAT 168 and CS 525. Hardware, software used in computer graphics; refresh, storage, and raster scan hardware; two-dimensional transformations, clipping, windowing, display files, and input devices.

626. Advanced Computer Architecture. 3 hrs. Prerequisites: CS 303, CET 370. Introduction to various architectures and techniques that have been developed or are proposed in the literature. Pipelined architecture, dynamic system architecture, data flow architecture, and array processing.

632. Artificial Intelligence. 3 hrs. Prerequisite: CS 412/512. Computer representation of knowledge, problem solving, automated deductive systems, computer learning, computer implementation of AI problems and expert systems.

636. Statistical Simulation and Modeling. 3 hrs. Prerequisites: CS 307, CSS 515. Formulation of models and the design of simulation programs. Simulation languages such as GPSS, SIMSCRIPT II.5 and NDTRAN.

638. Information Structures. 3 hrs. Prerequisite: CS 307. Analysis of algorithms, recurrence relations, directed and undirected graphs, application of techniques to analysis of algorithms in graph theory, and sorting and searching.


650. Computer Networks. 3 hrs. Prerequisite: CS 406/506 or permission of instructor. An in-depth study of local area/ metropolitan and local haul networks including their use, topology, design, and various network protocols.

690. Seminar in Computer Science. 1 hr.

691. Topics in Computer Science. 3 hrs. Special topics in computer science of current interest to faculty and students, e.g., robotics, neural networks, and pattern recognition. May be repeated for credit at discretion of academic adviser.

695. Directed Study. 1-3 hrs. Individual study by a student on an area or problem approved by the student’s academic adviser.

697. Independent Study and Research. 1-9 hrs. arranged. Not to be counted as credit toward a degree. Students actively working on a thesis, consulting with the major professor, or using other resources of the university may enroll in this course. Students who are not in residence and who are not enrolled in at least 3 hours of thesis but who are actively working on a thesis, consulting with the major professor, or using other resources of the university must enroll in this course for at least 3 hours each semester.

698. Thesis. 1-6 hrs. for a total of 6 hrs. Credit deferred until thesis is completed.

699. Project. 3 hrs.

Computer Science and Statistics (CSS)

500. Introduction to Computer Education. 3 hrs. Introduction to concepts, techniques, materials, and resources for teaching computer science concepts, problem solving and programming relative to computer literacy. Research and presentations related to computer science education.

501. Computer Skills for Research. 3 hrs. Prerequisite: CSS 240. Editing of data files, computer system utilization, use of BMD, SPSS, MINITAB for processing research data. Cannot be used to satisfy Computer/Computational Science M.S. requirements.
502. **Structured Basic Programming.** 3 hrs. Prerequisite: CSS 500. Technical presentation of BASIC with scientific problem solving, algorithms and introduction to data structures. Cannot be used to satisfy Computer/Computational Science M.S. requirements.

503. **Authoring Systems for Computer-based Learning.** 3 hrs. Prerequisite: CSS 500. Developing computer-based instructional modules utilizing the authoring system approach. Cannot be used to satisfy Computer/Computational Science M.S. requirements.

504. **Internet Concepts.** 3 hrs. Prerequisite: Basic computer literacy. Introduction to the information superhighway via the Internet. Cannot be used to satisfy Computer/Computational Science M.S. requirements.

505. **Advanced Internet: CGI Programming.** 3 hrs. Prerequisites: Knowledge of the Internet, basic HTML, some high-level programming language. Basic review of WWW and HTML, forms and forms processing, CGI programming, Java programming, VRML, security, and privacy issues.


516. **Methods of Mathematical Statistics II.** 3 hrs. Prerequisite: CSS 515. Orthogonal polynomial contrasts, multi-way classification anova, simple and multiple linear regression, polynomial regression.

518. **Sampling Methods.** 3 hrs. Prerequisite: CSS 515. The planning, execution and evaluation of sample surveys. Simple random sampling, stratified random sampling, cluster sampling.

525. **Virtual Reality.** 3 hrs. Comprehensive study of virtual reality techniques.

560. **Unix System and Network Administration.** 3 hrs. Prerequisite: CSS 360. An introduction to implementing gateway services, firewalling, and providing simple network services. Survey of other implementation of the Linux Operating system.

630. **Communications Engineering Fundamentals.** 3 hrs. Prerequisite: Permission of instructor. Basic concepts of components and systems that provide electrical communications. Does not apply to Computer Science degree.


632. **Communication Systems Analysis.** 3 hrs. Prerequisite: CSS 631. Principles and techniques for analyzing the technical performance of voice and data communication systems. Does not apply to Computer Science degree.


636. **Stochastic Processes and Queuing Theory.** 3 hrs. Prerequisite: MAT 385. Poisson process, Markov processes, and Queuing theory.

637. **Least Squares Techniques.** 3 hrs. Prerequisite: CSS 516. Regression analysis, curvilinear regression, discriminant and factor analysis.

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### Construction Engineering Technology (BCT)

502. **Innovation in Construction Management.** 3 hrs. Prerequisite: Permission of instructor. Study the historical development of and possible future.

507. **Advanced Construction Equipment.** 3 hrs. Methods of specification, selection, and charge rate development for construction heavy equipment.

508. **Route Surveying.** 2 hrs. Prerequisite: BCT 205. Corequisite: BCT 508L. Principles for the design and layout of routes. Coverage includes horizontal and vertical alignment, route location, earthwork, computation, ground photogrammetric survey methods, and special survey methods for highways, pipelines, transmission lines, and urban construction.

508L. **Route Surveying Laboratory.** 2 hrs. Corequisite: BCT 508.

509. **Boundary Surveying.** 2 hrs. Prerequisite: BCT 205. Corequisite: BCT 509L. The application of knowledge of the science of surveying measurement, the legal principles of boundary location, the laws related to boundaries and land use, the land planning and development concepts pertinent to subdivision of land and property surveys.

509L. **Boundary Surveying Laboratory.** 1 hr. Corequisite: BCT 509.

544. **Building Structures.** 3 hrs. Design of reinforced concrete structural members and systems. Concrete formwork design and cost analysis.

545. **Soils and Foundations.** 2 hrs. Theory and application of soil mechanics to foundation design and construction.

545L. **Soils and Foundations Laboratory.** 1 hr.

546. **Hydraulics and Surface Drainage.** 2 hrs. Prerequisite: BCT 544. Corequisite: BCT 546L. Hydraulic analysis and design of urban, highway, airport, and watershed drainage problems; discussion of overload and drainage channel flows; hydraulics of storm-drain systems and culverts; determination of design flow of runoff from drainage from highways, airports, and urban areas; design of drainage gutters, channels, sewer networks, and culverts.

546L. **Hydraulics and Surface Drainage Laboratory.** 1 hr. Corequisite: BCT 546.