CPSC 4160* 2-D Game Engine Construction 3(3)
Introduction to tools and techniques necessary to build 2-D games. Techniques draw from subject areas such as software engineering, algorithms, and artificial intelligence. Students employ techniques such as sprite animation, parallax scrolling, sound, AI incorporated into game sprites, and the construction of a game shell. Preq: CPSC 2120 and 2150, each with a C or better.

CPSC 4200* Computer Security Principles 3(3)
Covers principles of information systems security, including security policies, cryptography, authentication, access control mechanisms, system evaluation models, auditing, and intrusion detection. Computer security system case studies are analyzed. Preq: CPSC 3220 or ECE 3220; and 3600, each with a C or better.

CPSC 4240* System Administration and Security 3(3)
Covers principles of information systems security, including security policies, cryptography, authentication, access control mechanisms, system evaluation models, auditing, and intrusion detection. Computer security system case studies are analyzed. Preq: CPSC 3220 or ECE 3220; and 3600, each with a C or better.

CPSC 4620* Database Management Systems 3(3)
Introduction to the methods and problems of computational science. Uses problems from engineering and science to develop mathematical and computational solutions. Case studies use techniques from Grand Challenge problems. Emphasizes the use of networking, group development, and modern programming environments. Preq: MATH 1080 and MATH 3110. Students are expected to have previous programming experience in a higher level language.

CPSC 4630* On-line Systems 3(3)
In-depth study of the design and implementation of transaction processing systems and an introduction to basic communications concepts. A survey of commercially available teleprocessing monitor and database management systems is made. Includes Honors sections. Preq: CPSC 2120 and CPSC 2150, each with a C or better.

CPSC 4720* Software Development Methodology 3(3)
Advanced topics in software development methodology. Techniques such as chief programmer teams, structured design and structured walkthroughs are discussed and used in a major project. Emphasizes the application of these techniques to largescale software implementation projects. Also includes additional topics such as mathematical foundations of structured programming and verifi
tion techniques. Includes Honors sections. Preq: CPSC 3720 with a C or better.

CPSC (ECE) 4780* General Purpose Computation on Graphical Processing Units 3(3)
Instruction in the design and implementation of highly parallel, GPU-based systems to computationally intensive problems from a variety of disciplines. The OpenCL language with interoperable OpenGL components is used. Applications to models of physical systems are discussed in detail. May also be offered as ECE 4780. Preq: CPSC 2120 or ECE 2230.

CPSC 4810* Selected Topics 1-3(1-3)
Areas of computer science in which nonstandard problems arise. Innovative approaches to problem solutions which draw from a variety of support courses are developed and implemented. Emphasizes independent study and projects. May be repeated for a maximum of six credits, but only if different topics are covered. Includes Honors sections.

CPSC 4820* Special Topics in Computing 3(3)
In-depth treatment of topics not fully covered in regular courses. Topics vary from semester to semester. May be repeated, but only if different topics are covered.

CPSC 4910 Seminar in Professional Issues II 3(2)
Considers the impact of computing system development on society. Discusses ethical issues in the design and development of computer software. Students discuss standards for professional behavior, the professional’s responsibility to the profession, and techniques for maintaining currency in a dynamic field. Preq: CPSC 3720 and junior standing. Coreq: CPSC 4911.

CPSC 4911 Seminar in Professional Issues II Laboratory 0(2)
Non-credit laboratory to accompany CPSC 4910. Coreq: CPSC 4910.

CPSC 4950 Senior Thesis Research (Honors) 1-3(1-3)
Directed individual research project for honors students supervised by departmental faculty. May be repeated for a maximum of six credits. Preq: Senior standing.

CITY AND REGIONAL PLANNING

CPSC 4720* Software Development Methodology 3(3)
Advanced topics in software development methodology. Techniques such as chief programmer teams, structured design and structured walkthroughs are discussed and used in a major project. Emphasizes the application of these techniques to largescale software implementation projects. Also includes additional topics such as mathematical foundations of structured programming and verifi
tion techniques. Includes Honors sections. Preq: CPSC 3720 with a C or better.

CRP 4030* Seminar on Planning Communication 3(3)
In-depth analysis of methods to communica
tion planning and policy decisions effectively. Familiarizes students with the various communication skills needed by planners, policy makers, and other professionals to become successful practitioners. Preq: Consent of instructor.

CRP (CE) 4120* Urban Transportation Planning 3(3)
Consideration of urban travel characteristics, characteristics of transportation systems, transportation and land-use studies, trip distribution and trip assignment models, city patterns and subdivision layout. May also be offered as CE 4120. Preq: CE 3110.

CRP 4300* The Nature of Geographic Information Systems (GIS) 3(2)
Introduction to the theory and practical use of Geographic Information Systems (GIS). The course emphasizes geographical and statistical information and how it is represented and analyzed with computers. It introduces the concepts and components of GIS and how they affect societal issues. Coreq: CRP 4301.

CRP 4301* The Nature of Geographic Information Systems (GIS) Laboratory 0(3)
Non-credit laboratory to accompany CRP 4300. Coreq: CRP 4300.

CONSTRUCTION SCIENCE AND MANAGEMENT

Professors: D.C. Bausman, S.N. Clarke, R.W. Lipsa, C.A. Piper; Assistant Professors: J.M. Burgett, J.D. Lucas

CSM 1000 Introduction to Construction Science and Management 3(3)
Introduction to the construction industry and the Construction Science and Management Department. Preq: Construction Science and Management major.

CSM 1500 Construction Problem Solving 3(3)

CSM 2010 Structures I 3(3)
Study of statically determinate structural components and systems, including force applications and distributions in structural elements and the resulting stress-strain patterns in axial, shear, and bearing mechanisms. Preq: MATH 1020 or MATH 1060; and PHYS 2070 and PHYS 2090; and Construction Science and Management or Architecture major.

CSM 2020 Structures II 4(3)
Study of force distribution and behavior in statically determinate structural components and systems; analysis and design of basic reinforced concrete, steel, wood, and formwork components and systems, including shear and moment stress, combined loading/ stress conditions, and deflections. Preq: CSM 2010; and Construction Science and Management or Architecture major. Coreq: CSM 2021.

CSM 2021 Structures II Laboratory 0(2)
CSM 2030 Materials and Methods of Construction I 3(3) Descriptive study of the materials and methods of construction, focusing on nomenclature, building materials, and assembly of building systems consisting primarily of wood, masonry, residential interior and exterior finishes, and building foundations. Preq: Construction Science and Management or Architecture major. Preq or concurrent enrollment: ART 2100 and CSM 1000. (Architecture majors do not need the preq courses, but must request a registration override from the instructor).

CSM 2040 Contract Documents 3(2) Introduction to working drawings, specifications, and the various documents required to carry out a typical construction project. Preq: Construction Science and Management major, or consent of department chair. Coreq: CSM 2041 and CSM 2050.

CSM 2041 Contract Documents Laboratory 0(3) Non-credit laboratory to accompany CSM 2040. Coreq: CSM 2040.

CSM 2050 Materials and Methods of Construction II 3(3) Descriptive study of materials and methods of construction, focusing on nomenclature, building materials, and assembly of building systems consisting primarily of steel and concrete, in addition to roofing assemblies and interior and exterior commercial finishes. Preq: CSM 2030; and Construction Science and Management or Architecture major. Coreq: CSM 2040.

CSM 3030 Soils and Foundations 3(3) Study of various types of soils and foundations, including soil testing, reports, compaction, stability, and function, as they relate to the construction process. Preq: CSM 2020, and Construction Science and Management major.

CSM 3040 Environmental Systems I 3(3) Theory and practice of heating, ventilating, air conditioning, and plumbing systems for buildings. Preq: CSM 2050 and PHYS 2080 and PHYS 2100, and Construction Science and Management or Architecture major.

CSM 3050 Environmental Systems II 3(3) Theory and practice of fire protection, specialty piping, lighting, and electrical systems for buildings. Preq: CSM 3040 and Construction Science and Management or Architecture major.

CSM 3510 Construction Estimating 3(2) Study of basic estimating as applied to construction projects. Includes the take-off of material quantities, assigning labor and equipment production rates, and applying material prices, wage rates, and equipment costs to derive a total job cost. Preq: CSM 2040 and CSM 2050 and MGT 2180, all required MATH courses, Construction Science and Management major. Preq or concurrent enrollment: AGM 2210 and CSM 3030. Coreq: CSM 3510.

CSM 3511 Construction Estimating Laboratory 0(2) Non-credit laboratory to accompany CSM 3510. Coreq: CSM 3510.


CSM 3521 Construction Scheduling Laboratory 0(2) Non-credit laboratory to accompany CSM 3520. Coreq: CSM 3520.

CSM 3530 Construction Estimating II 3(2) Continuation of basic construction estimating with the additional component of computerized estimating. Includes material, labor, and equipment costs, production rates, bid ethics, constructability analysis, and understanding of other types of estimating procedures. Preq: CSM 3510 and Construction Science and Management major. Preq or concurrent enrollment: CSM 3040. Coreq: CSM 3520 and CSM 3531.

CSM 3531 Construction Estimating II Laboratory 0(2) Non-credit laboratory to accompany CSM 3530. Coreq: CSM 3530.


CSM 4200 Highway Construction and Contracting 3(3) Study of contracting and construction of highways, including selection and use of equipment, construction of pavements, bridges, and drainage structures, and related processes. Preq: CSM 3030 and CSM 3520 and CSM 3530.

CSM 4500 Construction Internship 1(1) Documentation of 800 hours of approved experience in the construction industry with evaluation of student portfolio and preparation and sitting for the American Institute of Constructors CPC Level I examination. Preq: Consent of department chair.

CSM 4530 Construction Project Management 3(3) Study of construction business organization, methods of project delivery, field organization, policy, ethics, project management, control systems, labor management relations, and productivity. Preq: CSM 3520 and CSM 3530, and Construction Science and Management major. Preq or concurrent enrollment: LAW 3220 and MGT 3070. Coreq: CSM 4110 and CSM 4610.

CSM 4540 Construction Capstone 6 (5) Students develop a capstone project that entails the knowledge obtained in all previous courses in the Construction Science and Management Program. Students must take the capstone course at Clemson University. Preq: CSM 4530 and Construction Science and Management major. Coreq: CSM 4541.

CSM 4541 Construction Capstone Laboratory 0(2) Non-credit laboratory to accompany CSM 4540. Coreq: CSM 4540.

CSM 4550 Reducing Adversarial Relations in Construction 3(3) Focuses on the study of the delivery of projects and how adversarial relations can affect the successful completion of the venture. Topics include management of human resources, understanding the needs and processes of the participants, where problems lie, methods of avoiding and settling disputes. Preq: Construction Science and Management or Architecture major, and senior standing.


CSM 4900 Directed Studies 1-3(1-3) Comprehensive studies and research of special topics not covered in other courses. Emphasizes field studies, research activities, and current developments in construction science. May be repeated for a maximum of six credits. Includes Honors sections. Preq: Consent of instructor.

CSM 4980 Current Topics in Construction 1-3(1-3) Study of current topics in the construction industry not central to other construction science courses. Specific titles and course descriptions are announced for each semester. May be repeated for a maximum of six credits. Preq: Consent of department chair.

CAREER AND TECHNOLOGY EDUCATION

CTE 1150 Contemporary Technological Problems 3(3) Provides students with an understanding of the problems and contributions of technology. Examples are taken from historical accounts and from analyses of contemporary technological intervention both in industrialized and nonindustrialized countries.

CTE 2210 Exploring Technology 3(3) Covers a wide range of technological concepts along with familiar examples of how technology impacts our lives as individuals, a society, and a global community.

CTE 3100 Designing Creative Instruction 3(2) Provides preservice teachers with opportunities to develop skills in technological literacy, design, inquiry-based instruction, and problem solving using a variety of media, with emphasis on their applications in the elementary curriculum. Preq: Junior standing in Early Childhood or Elementary Education. Coreq: CTE 3101.

CTE 3101 Designing Creative Instruction Laboratory 0(2) Non-credit laboratory to accompany CTE 3100. Coreq: CTE 3100.

CLEMSON UNIVERSITY

CU 1000 Clemson Connect 0(0) Introduction to the learning experience at Clemson University. Includes instruction in information technology and information skills. To be taken Pass/No Pass only.

CU 1010 University Success Skills 2(3) Introduction to a variety of topics critical to students' success. Topics include time management, goal setting, test taking, campus resources and policies, critical thinking, and diversity. Students are given opportunities to discover and practice many procedures, techniques, and tips. Limited to freshmen and first semester transfer students.

CU 1100 Introduction to Tutoring 1(1) Students develop and reinforce skills in tutoring and communication through use of techniques based in educational research. To be taken Pass/No Pass only.

CU 1110 Introduction to Supplemental Instruction 1(1) Students develop and reinforce interpersonal relationship skills in listening, decision making, communicating, group dynamics, leadership, assertiveness, time management, problem solving, and conflict resolution. To be taken Pass/No Pass only.