998. Physical Chemistry Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 3 credits in all enrollments for this course.
R: Open only to graduate students in Chemistry.
Advances in physical chemistry reported by graduate students.
QA: CEM 998

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 20 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to graduate students in Chemistry.

QA: CEM 999

CHINESE CHS

Department of Linguistics and Germanic, Slavic, Asian and African Languages
College of Arts and Letters

101. Elementary Chinese I
Fall. 4(4-1)
Pronunciation, writing system, and basic vocabulary and sentence patterns, with emphasis on conversation.
QA: CHS 101, CHS 102

102. Elementary Chinese II
Spring. 4(4-1)
P: CHS 101 or approval of department.
Further work on conversation, character writing, and comprehension, with increasing emphasis on vocabulary building and grammar.
QP: CHS 101 QA: CHS 102, CHS 103

201. Second-Year Chinese I
Fall. 4(4-1)
P: CHS 102 or approval of department.
Intermediate-level work on skills in conversation, comprehension, and grammar. Practice in composition.
QP: CHS 103 QA: CHS 201, CHS 202

202. Second-Year Chinese II
Spring. 4(4-1)
P: CHS 201 or approval of department.
Further intermediate-level work on skills in conversation, comprehension, and grammar. Continued practice in composition.
QP: CHS 201 QA: CHS 202, CHS 203

301. Third-Year Chinese I
Fall. 4(4-0)
P: CHS 202.
Advanced-level work on speaking, listening comprehension, reading, and writing skills, based on materials of cultural interest.
QP: CHS 203 QA: CHS 301, CHS 302

302. Third-Year Chinese II
Spring. 4(4-0)
P: CHS 301.
Advanced-level work on speaking, listening comprehension, reading, and writing skills, based on materials of cultural interest.
QP: CHS 301, CHS 321 QA: CHS 302, CHS 303

350. Studies in the Chinese Language
Spring. 3(3-0)
P: CHS 201 or approval of department.
Chinese phonology, morphology, and syntax.
QP: CHS 203

401. Fourth-Year Chinese I
Fall. 3(3-0)
P: CHS 302.
Reading, discussion and writing based on original materials, including classical texts of cultural interest.
QP: CHS 303, CHS 321 QA: CHS 401, CHS 431

402. Fourth-Year Chinese II
Spring. 3(3-0)
P: CHS 401.
Further reading, discussion and writing based on original materials, including classical texts of broad cultural interest.
QP: CHS 303, CHS 321 QA: CHS 401, CHS 420

499. Senior Thesis Research
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course.
R: Approval of department.
An individual research project supervised by a faculty member that demonstrates the student's ability to do independent research and submit or present a major paper.

CIVIL ENGINEERING CE

Department of Civil Engineering
College of Engineering

271. Engineering Surveying
Fall, Spring. 4(3-3)
P: MTH 120.
Application of surveying and error analysis to civil engineering problems. Earth work. Calculations. Layout and management of construction sites.
QP: MTH 112 QA: CE 252, CE 251

280. Introduction to Environmental Engineering
Fall, Spring. 3(3-0)
P: CEM 141 or CEM 151, MTH 132, CPS 130 or CPS 131.
Elements of hydrology. Groundwater and surface water supply and contamination. Treatment systems for drinking water, wastewater, air, and solid and hazardous waste. Introduction to noise and radiation pollution.
QP: CEM 141, CEM 151, MTH 112, CPS 112 QA: CE 280

305. Structural Analysis
Fall, Spring. 3(3-0)
P: MSM 211, CE 390 or concurrently. R: Open only to Civil Engineering majors.
Determinate and indeterminate plane structures. Linearity, stability, determinacy. Virtual-work calculation of forces and displacements. Flexibility and stiffness methods in plane structures.
QP: MMM 211 QA: CE 305, CE 306

312. Soil Mechanics
Fall, Spring. 3(2-3)
P: MSM 211. R: Open only to Civil Engineering and Agricultural Engineering majors.
Engineering properties of soil and their measurement. Effective-stress concept. Permeability and seepage. Compaction. Consolidation, shear strength and stress-strain behavior.
QP: MMM 211 QA: CE 312

321. Introduction to Fluid Mechanics
Fall, Spring. 4(3-2)
P: MSM 306 or concurrently. R: Open only to Civil Engineering and Agricultural Engineering majors. Not open to students with credit in ME 332.
Fluid properties, fluid statics, fluids in motion. Conservation of mass, energy and momentum. Dimensional analysis and similitude. Internal and external flows. Applications.
QP: MTH 310, MMM 306 QA: CE 321

337. Civil Engineering Materials I
Fall, Spring. 4(3-3)
P: MSM 211 or concurrently. R: Open only to Civil Engineering majors.
Common civil engineering construction and paving materials: aggregates, inorganic cements, asphalts, concretes, wood and steel. Composition, structure, physical and mechanical properties, tests, and production mix design.
QP: MMM 211 QA: CE 308

346. Transportation
Fall, Spring. 3(3-0)
P: MTH 133. R: Open only to Civil Engineering, Engineering Arts, and Urban Planning students.
Planning, design, and evaluation of transportation systems. Transportation demand, capacity, delay, and service quality. Elements of geometric design.
QP: MTH 113 QA: CE 346

370. Engineering Economics
Fall, Spring. 3(3-0)
P: MTH 133. R: Open only to College of Engineering students.
Economic decision making in the context of evaluation of engineering projects. Net present worth and related methods of analysis. Depreciation. Before- and after-tax analysis. Sensitivity analysis, inflation, expected value.
QP: MTH 113 QA: CE 370

373. Construction Estimating and Scheduling
Fall. 3(3-0)
R: Open only to College of Engineering and Building Construction Management majors.
Estimating quantities and costs for construction projects. Optimal scheduling of personnel and equipment subject to constraints and uncertainty.
QA: CE 372 CE 471

390. Civil Engineering Analysis
Fall, Spring. 3(3-0)
P: CPS 130 or CPS 131; MTH 235; MSM 211 or concurrently. R: Open only to College of Engineering majors.
Application of numerical methods and computing to civil engineering problems. Random variables in civil engineering. Problem solving methods. Report preparation.
QP: CPS 112, MTH 310, MMM 211 QA: CE 390

400. Structural Mechanics
Fall. 3(3-0)
P: CE 305, CE 390. R: Open only to Civil Engineering majors.
Matrix methods of structural analysis. Flexibility method. Direct stiffness method for plane structures. Elastic supports, inclined supports, member releases and non-prismatic members. Application software.
QP: CE 306, CE 390 QA: CE 400, CE 410

405. Design of Steel Structures
Fall, Spring. 3(3-0)
P: CE 305. R: Open only to Civil Engineering majors.
Design of steel beams, columns, tension members and connections. Stability and plastic strength.
QP: CE 306, CE 390 QA: CE 405

406. Design of Concrete Structures
Fall, Spring, Summer. 3(3-0)
P: CE 305, CE 337. R: Open only to Civil Engineering majors.
Design of reinforced concrete beams, slabs, columns and footings.
QP: CE 306, CE 308, CE 390 QA: CE 406

407. Structural System Design
Spring. 3(3-0)
P: CE 405 or concurrently; CE 406. R: Open only to Civil Engineering majors.
Building or bridge design using steel, concrete, wood, or other materials. Approximate methods. Wind and earthquake forces.
QP: CE 405, CE 406 QA: CE 407

418. Geotechnical Engineering
Fall. 4(4-0)
P: CE 312, CE 390. R: Open only to Civil Engineering majors.
Shallow foundation design including bearing capacity, stress distribution, and settlement analysis. Pile foundations. Design of retaining structures including rigid walls, braced excavations, and sheet-pile walls. Stability of slopes and embankments.
QP: CE 312, CE 390 QA: CE 418, CE 419

421. Engineering Hydrology
Fall. 3(3-0)
P: STT 351; CE 321 or concurrently. R: Open only to College of Engineering, College of Natural Science, and Crop and Soil Sciences majors.
Hydrologic cycle, streamflow, precipitation, evapotranspiration, infiltration, groundwater. Quantitative methods of analysis: probability, unit hydrograph, routing, and flow nets. Groundwater supply development, well flows.
QP: CE 321, STT 351 QA: CE 421