

## Core Courses - Descriptions & Prerequisites

### **Chemistry 121 General Chemistry U 5**

First course for science majors and engineering students, covering dimensional analysis, atomic structure, the mole, stoichiometry, chemical reactions, electron configuration, periodicity, bonding, and molecular structure.

Su, Au, Wi, Sp Qtrs. 4 cl, 3 lab hrs. Prereq: One unit of high school chem and eligibility to enroll in Math 150. Not open to students with credit for H201 or 204. Safety glasses must be worn in lab. This course is available for EM credit. GEC phys sci course. NS Admis Cond course.

### **Chemistry 122 General Chemistry U 5**

Continuation of 121 for science majors, covering acids and bases, redox reactions, gases, liquids, solids, solutions, colligative properties, thermochemistry, kinetics, and chemical equilibrium.

Su, Au, Wi, Sp Qtrs. 4 cl, 3 lab hrs. Prereq: 121 or completion of 101 with a grade of A or A- and eligibility to enroll in Math 150. Not open to students with credit for 125 or H202 or 205. Safety glasses must be worn in lab. This course is available for EM credit. GEC phys sci course. NS Admis Cond course.

### **Chemistry 123 General Chemistry U 5**

Continuation of 122 for science majors, covering solubility and ionic equilibria, qualitative analysis, electrochemistry, descriptive chemistry, coordination compounds, and nuclear chemistry.

Su, Au, Wi, Sp Qtrs. 3 cl, 6 lab hrs. Prereq: 122. Safety glasses must be worn in lab. This course is available for EM credit. GEC phys sci course.

### **Chemistry 251 Organic Chemistry U 3**

Structure, nomenclature, physical properties, preparation, and reactions of hydrocarbons, alcohols, and ethers.

Au, Wi Qtrs. 4 cl. H251 (honors) may be available to students enrolled in an honors program or by permission of department or instructor. Prereq: 123 or H203.

### **Chemistry 252 Organic Chemistry U 3**

Chemistry of carbonyl compounds, acids and their derivatives, and amines and aromatic compounds.

Wi, Sp Qtrs. 4 cl. H252 (honors) may be available to students enrolled in an honors program or by permission of department or instructor. Prereq: 251.

### **Chemistry 253 Organic Chemistry U 3**

Selected topics in organic chemistry such as: carbohydrates, amino acids, nucleic acids, spectroscopic methods, polymers, and molecular orbital theory.

Su, Au, Sp Qtrs. 4 cl. H253 (honors) may be available to students enrolled in an honors program or by permission of department or instructor. Prereq: 252.

**Chemistry 254 Organic Chemistry Laboratory U 3**

Introduction to the laboratory techniques of organic chemistry, including synthesis, isolation, purification, and identification of organic compounds.

Au, Wi, Sp Qtrs. 1 cl, 2 4-hr labs. H254 (honors) may be available to students enrolled in an honors program or by permission of department or instructor. Prereq for 254: Prereq or concur: 252. Prereq for H254: Prereq or concur: 252, and permission of instructor. Not open to students with credit for 243-244. H254: Wi Qtr only. Safety glasses must be worn in lab.

**Chemistry 530 Physical Chemistry U G 3**

Quantum chemistry.

Au Qtr. 3 cl. Prereq: 221 or 251 or equiv; Physics 113 or 133; Math 254; prereq or concur: Math 255; concur 541 recommended for chem majors. Not open to students with credit for 533.

**Chemistry 531 Physical Chemistry U G 3**

Statistical mechanics and thermodynamics.

Wi Qtr. 3 cl. Prereq: 530; concur 542 recommended for chem majors.

**Chemistry 532 Physical Chemistry U G 3**

Thermodynamic equilibrium and chemical kinetics.

Sp Qtr. 3 cl. Prereq: 531.

**Chemistry 541 Physical Chemistry Laboratory U G 3**

Quantitative measurements of chemical phenomena and the application of chemical principles to their interpretation.

Au, Wi, Sp Qtrs. 1 cl, 8 lab hrs. Prereq or concur: 520 or 530. Safety glasses must be worn in lab

**Chemical Eng 200 Chemical Engineering and Process Calculations U 3**

The application of physico-chemical principles to problems of the chemical industry; emphasis on graphical methods, stoichiometry, heat, and material balances.

Au, Wi Qtrs. 2 cl, 2 comp lab hrs. Prereq: Chem 123 and a minimum CPHR of 2.00, and prereq or concur: Math 254 and Physics 131.

**Chemical Eng 201 Chemical Engineering and Process Calculations U 3**

Continuation of 200.

Wi, Sp Qtrs. 2 cl, 2 comp lab hrs. Prereq: 200 and prereq or concur: Math 415 and Physics 132.

**Chemical Eng 420 Elements of Chemical Engineering- Transport Phenomena I U 4**

Introduction to momentum, mass, and heat transfer with emphasis on the analogies between them; practical applications of momentum transfer (fluid flow).

Sp Qtr. 3 cl, 2 comp lab hrs. Prereq: 201, Math 415, Physics 132, or equiv with written permission of instructor.

**Chemical Eng 508 Chemical Engineering Thermodynamics I U G 3**

Application of the fundamental concepts and laws of thermodynamics to problems of the chemical industry; stress on computational problem work.

Au Qtr. 2 cl, 2 comp lab hrs. Prereq: 201 and 420.

**Chemical Eng 509 Chemical Engineering Thermodynamics II U G 3**

Continuation of 508.

Wi Qtr. 2 cl, 2 comp lab hrs. Prereq: 508.

**Chem Eng 521 Elements of Chemical Engineering-Transport Phenomena II U G 3**

Continuation of transport theory with emphasis on heat transfer and introduction to radiation; basic principles developed and illustrated with problems from chemical engineering practice.

Au Qtr. 2 cl, 2 comp lab hrs. Prereq: 420 or 520, and a second writing course. GEC course.

**Chem Eng 522 Elements of Chemical Engineering-Transport Phenomena III U G 3**

Continuation of the study of transport theory; emphasis on mass transfer and stagewise operations with applied computational problems.

Wi Qtr. 2 cl, 2 comp lab hrs. Prereq: 521.

**Chemical Eng 523 Chemical Engineering Operations U G 4**

The application of transport phenomena such as fluid, heat, and mass transfer to the chemical engineering operations of evaporation, distillation, drying, etc.

Sp Qtr. 3 cl, 2 comp lab hrs. Prereq: 522 and Chem 532.

**Chemical Eng 610 Chemical Engineering Kinetics U G 4**

Chemical and engineering principles for the design and operation of chemical reactors; kinetics of simple homogeneous systems and introduction to heterogeneous catalysis.

Sp Qtr. 3 cl, 2 comp lab hrs. Prereq: 509 or Chem 532, and 522.

**Chemical Eng 624 Chemical Process Dynamics and Control I U G 4**

Study of the dynamics and control of chemical processes; mathematical models of simple processes, including feedback control, are derived, analyzed, and simulated.

Au Qtr. 3 cl, 2 comp lab hrs. Prereq: 523, 610, 630

### **Chemical Eng 630 Chemical Engineering Operations Laboratory U G 4-8**

The fundamental laboratory course in the chemical engineering operations; laboratory investigation of the operating characteristics and efficiency of chemical engineering equipment such as distillation, drying, filtration, etc.

Su Qtr. 5 conf, 7-19 lab hrs. Prereq: 523 or equiv with written permission of instructor. GEC course

### **Chemical Eng 750 Profession of Chemical Engineering U 0-1**

The roles in professional activities performed by chemical engineers, code of ethics, professional registration, professional societies, responsibilities to management and to labor and as an administrator.

Sp Qtr. 1-hr cl. Prereq: Jr standing. Repeatable to a maximum of 2 cr hrs. This course is Progress ("P") graded. Progress graded Sp Qtr, credit/grade awarded upon completion of Au Qtr.

### **Chemical Eng 760 Chemical Engineering Economy and Strategy U G 4**

Economic and strategy considerations in research; development, design, and manufacturing in the chemical process industry; cost estimation and economic optimization of chemical engineering operations and chemical processes.

Au Qtr. 3 cl. 1 recitation. Prereq: 610 and 630. GEC course.

### **Chemical Eng 762 Chemical Engineering Process Development U G 4**

Library, laboratory, and pilot plant research and development of chemical processes of industrial potential justified by preliminary economic studies; preparation of optimum process flow sheets; plant design studies.

Sp Qtr. 1 cl 11 lab hrs. Prereq: 610, 630, and prereq or concur: 760. GEC course.

### **Chemical Eng 764 Chemical Engineering Process Design U G 4**

Process design studies on selected chemical processes encompassing a broad spectrum of fundamental engineering principles; optimization studies utilizing economic and technical simulation.

Wi Qtr. 2 cl, 2 4-hr labs. GEC course.

### **CIS 202 Introduction to Programming and Algorithms U 4**

Introduction to computer programming and to problem solving techniques using computer programs with applications in engineering and the physical sciences; algorithm development; programming lab experience.

Au, Wi, Sp Qtrs. 3 1-hr lec, 1 2-hr lab. Prereq: Math 151. Not open to students with credit for 201, 221, or En Graph 167. C++ is taught.

\*Note: This course *or* Engineering H192 *or* Engineering Graphics 167 is required

**Electrical Eng 300 Electrical Circuits U 3**

Introduction to circuit analysis; circuit analysis concepts and their extension to mechanical and thermal systems by analogy; electrical instruments and measurements.

Au, Wi, Sp Qtrs. 3 cl. Prereq: Physics 132, Math 254, minimum CPHR of 2.00, and in Eng college. Not open to Elec & Cptr Eng majors  
Engineering Courses

\* Note: This course *or* Mechanical Engineering 410 is required

**Engineering 181 Introduction to Engineering I U 3**

Visualization and sketches, introduction to spreadsheets and CAD, working drawings, experimental design and data analysis, problem solving approaches, hands-on lab, reporting, and production dissection.

Su (1st term), Au, Wi Qtrs. 2 cl, 3 lab hrs. Prereq: prereq or concur: Math 150 or higher.

\* Note: This course *or* Engineering H191 *or* Engineering 185 and 186 is required

**Engineering 183 Introduction to Engineering II U 3**

Team building, design/build project; project management, introduction to MATLAB, written and oral reports, preparation of visual aids, hands-on lab and reporting.

Su (2nd term), Wi, Sp Qtrs. 2 cl, 3 lab hrs. Prereq: 181 or H191. Not open to students with credit for 182.

\* Note: This course *or* Engineering H193 *or* Engineering 185 and 187 is required

**Engineering Graphics 167: Problem Solving through Programming U 4**

Solving engineering problems using computer programming; development of algorithms and program modules; solutions to major problems will be presented in an engineering report format.

Su, Au, Wi, Sp Qtrs. 4 2-hr cl/lab. Prereq or concur: Math 151 or better. Not open to students with credit for 200. VPA Admis Cond Course

\* Note: This course *or* Engineering H192 *or* Computer Science 202 is required

**Math 151 Calculus and Analytic Geometry U 5**

Limits, continuity, derivatives, Mean Value theorem, extrema, curve sketching, related rates, differentiation of the trig, log, and exponential functions.

Su, Au, Wi, Sp Qtrs. 5 cl. Prereq: 150 or satisfactory score on Ohio State Math Placement Test. Not open to students with credit for 141 or 161. This course is available for EM credit.

**Math 152 Calculus and Analytic Geometry U 5**

Integral, area, fundamental theorems of calculus, logarithmic and exponential functions, trigonometric and inverse trigonometric functions, methods of integration, applications of integration, polar coordinates.

Su, Au, Wi, Sp Qtrs. 5 cl. Prereq: 141 or 151. Not open to students with credit for 162. This course is available for EM credit.

\* Note: This course *or* Math 161 is required

**Math 153 Calculus and Analytic Geometry U 5**

Indeterminate forms, Taylor's formula, improper integrals, infinite series, parametric curves, and vectors in the plane; vectors, curves, and surfaces in space.

Su, Au, Wi, Sp Qtrs. 5 cl. Prereq: 152. Not open to students with credit for 263. This course is available for EM credit.

\* Note: This course *or* Math 162 is required

**Math 254 Calculus and Analytic Geometry U 5**

Partial differentiation, Lagrange multipliers, multiple integrals, line integrals, and Green's theorem.

Su, Au, Wi, Sp Qtrs. 5 cl. Prereq: 153. Not open to students with credit for 263. This course is available for EM credit.

\* Note: This course *or* Math 263 is required

**Math 415 Ordinary and Partial Differential Equations U 4**

Ordinary, partial, linear, and nonlinear differential equations; Fourier series; boundary value problems; and Bessel functions.

Su, Au, Wi, Sp Qtrs. 4 cl. Prereq: 254. Not open to students with credit for 255.

**Mechanical Eng 410 Statics U 4**

Vector concepts of static equilibrium for isolated and connected bodies, centroids, inertia, truss, frame and machine analysis, shear force and bending moment diagrams, and friction.

Au, Wi, Sp Qtrs. 3 64-min cl. Prereq: Engineer 182 or 183 or H192 or En Graph 167 or H167 or Cptr/Inf 201 or Cptr/Inf 202, and Physics 131, and Math 254 (prereq or concur). CPHR 2.00 or above recommended. Not open to students with credit for H210 or 400

\* Note: This course *or* Electrical Engineering 300 is required

**Physics 131 Introductory Physics: Particles and Motion U 5**

Major concepts of physics from a contemporary point of view; for students in physical sciences, mathematics, or engineering.

Su, Au, Wi, Sp Qtrs. 5 cl, 1 2-hr lab. Prereq: 1 entrance unit of physics or chem; and Math 151 and concur Math 152, or concur Math 161 or higher. This course is available for EM credit. NS Admis Cond course. GEC phys sci course.

**Physics 132 Introductory Physics: Electricity and Magnetism U 5**

Continuation of 131.

Su, Au, Wi, Sp Qtrs. 5 cl, 1 2-hr lab. Prereq: 131; and Math 152 and concur Math 153, or concur Math 162 or higher. This course is available for EM credit. NS Admis Cond course. GEC phys sci course.

**Physics 133 Intro. Physics: Thermal Physics, Waves, and Quantum Physics U 5**

Continuation of 132.

Su, Au, Wi, Sp Qtrs. 5 cl, 1 2-hr lab. Prereq: 132, and Math 153 or Math 162 or higher. This course is available for EM credit. NS Admis Cond course. GEC phys sci course.