Computer Science Technology (CTCH)

The following courses for the A.A.B. in computer science technology are available only on the Chillicothe, Lancaster and Southern campuses.

125 Introduction to Computers (4)
Prereq: C or better in MATH 101. Introduces productivity software within the framework of business applications. Involves hands-on assignments including Windows, word processing, spreadsheets, presentation graphics, the Internet, and e-mail.

127 Introduction to Website Management (4)
Introduction to Website management principles, skills, techniques, strategies, hardware, and software necessary to operate and maintain a successful Website or Intranet. Emphasis on how to maximize the usability of a website while maintaining the structure necessary to allow the site to change and grow.

133 Programming and Design I (5)
Prereq: MATH 101 or higher placement. Introduction to structured design and computer programming. Students analyze, design, program, test, and debug business applications. Emphasis is on top-down logic design and modular-structured programming.

134 COBOL Programming I (5)
Prereq: MATH 101 or higher placement. Introduction to structured design and COBOL programming. Students analyze, design, program, test, and debug business applications. Emphasis is on top-down logic design and modular-structured programming.

160 Network Concepts I (4)
Prereq: MATH 101 or higher placement. Concepts and principles of business data communications are explored. Topics include communication media and equipment, data transmission, protocols, networks, and network management.

161 Network Concepts II (4)
Prereq: C or better in CTCH 160. Concepts and principles of computer networks are explored. Topics include uses of computer networks, network basics, building a network, network management, and network security.

162 Network Systems I (4)
Prereq: C or better in CTCH 161. Concepts and principles of client server systems are explored. Topics include introduction to client server computing, understanding LAN, MAN, and WAN, how to build a client server system, and client server management.

189A Internets and Distributed Computing 1 (4)
Prereq: C or better in 160. An introduction to the use of internets and distributed computing. Study will focus on the theoretical foundations of internetworking including the OSI reference model, the TCP/IP reference model, network configurations, and networking protocols.

189B Internets and Distributed Computing 2 (4)
Prereq: C or better in 189A. A continuation of 189A, the course examines the routing and routed protocols used in internetworking, the hardware and software involved in the design, installation, configuration, maintenance, and evaluation of an internet.

189C Distributed Computer Applications (4)
Prereq: C or better in 189B. A continuation of 189B, this course focuses on the characteristics of distributed business applications including: databases, video conferencing, and enterprise resource planning.

189D Network Security (4)
Prereq: C or better in 189C. A continuation of 189C, the course provides an in-depth examination of distributed communication systems including the management of the infrastructure and the provision of network security.

233 Programming and Design II (5)
Prereq: C or better in 133. Continuation of 133 with emphasis on array handling and file processing.

234 COBOL Programming II (5)
Prereq: C or better in 134. Continuation of 134 with emphasis on table handling and file processing.

240 C/C++ Programming (5)
Prereq: MATH 101 or higher placement. An introduction to C programming language. Students analyze, design, program, test, and debug business-related applications. Emphasis on top-down logic design and modular structured programming.

241 Visual Programming (5)
Prereq: MATH 101 or higher placement. Introduction to logic and visual programming techniques. Includes analyzing, designing, coding, testing, and debugging computer applications using visual programming.

242 Java Programming (5)
Prereq: MATH 101 or higher placement. Introduction to logic and Java programming. Includes analyzing, designing coding, testing, and debugging computer applications using Java.

285 Database Management Systems (4)
Prereq: C or better in 125. Introduction to database management systems. Focus is on applying the techniques of data base to create effective and efficient information systems.

290 Special Topics (1–5, max 10)
Prereq: perm. Provides the opportunity to explore or expand upon subjects or topics not covered or only briefly covered in other CTCH courses. Topics may vary from year to year and may include either business or scientific applications in computer science.

291A Systems Analysis I (4)
Prereq: C or better in 125. This course looks at the planning and management of information systems projects, along with tools for analysis and evaluation of alternatives.

291B Systems Analysis II (4)
Prereq: C or better in 291A. Continuation of 291A with emphasis on designing and implementing information systems, along with testing and maintenance.

299 Practicum (1–10, max 20)
Prereq: perm.

Dance (DANC)

090 Composition Laboratory (0)
This course is to be taken in conjunction with composition classes.

101A Modern Dance Technique I (3)
Prereq: Dance major/minor or perm. required. Introduction to basic technical skills of modern dance including alignment, strength, flexibility, rhythmic accuracy, and reproduction of a movement shape.

102A Modern Dance Technique I (3)
Prereq: 101A or perm. required. Continuation of 101A.

103A Modern Dance Technique I (3)
Prereq: 102A or perm. required. Further development of 102A.

101B Ballet Technique I (2)
Prereq: Dance major/minor or perm. required. Introduction to ballet and the development of basic technical skills within the classical ballet tradition. Execution of basic ballet vocabulary with an emphasis on classical line.

102B Ballet Technique I (2)
Prereq: 101B or perm. required. Continuation of 101B.

103B Ballet Technique I (2)
Prereq: 102B or perm. required. Further development of 102B.

101C Beginning Composition (2)
Prereq: Dance major/minor or perm. required. Exploration of movement materials through improvisation and short problems dealing with rhythm, space, movement qualities, and dynamics.

102C Beginning Composition (2)
Prereq: 101C or perm. Continuation of 101C.

103C Beginning Composition (2)
Prereq: 102C or perm. Further development of 102C.

111 Music for Dance I (2)
Prereq: perm. Nature and principles of rhythmic structure in dance and music.

120 Introduction to Dance (2)
(A) modern dance, (B) ballet, (C) jazz.

150 Viewing Performance (2)
Integrates classroom and student life activities at the University by combining the OU Artist Series and major productions of the Schools of Music, Dance, and Theater with a seminar course dealing with characteristics of the medium and artistic concerns. A two-hour seminar precedes and follows each of the performances. No credit to those with credit for CA 150, MUS 150, or THAR 150.

170 Viewing 20th-Century Dance (4) (2H)
Art of dance from broad point of view, involving dance viewing, literature, and participation. Deals with aesthetic, physiological, social, and cultural aspects.

171 The Dance Experience (4) (2H)
A comprehensive course to introduce the beginning student to contemporary and classical dance forms including modern, ballet, and jazz dance styles. Discussions and readings cover historical and aesthetic perspectives. Live performances and studio practice contribute to students' experiential learning.

201A Modern Dance Technique II (3)
Prereq: 103A or perm. required. Development of basic technical skills for modern dance. More complex coordinations which add more spatial and dynamic considerations.

202A Modern Dance Technique II (3)
Prereq: 201A or perm. required. Continuation of 201A.

203A Modern Dance Technique II (3)
Prereq: 202A or perm. required. Further development of 202A.

201B Ballet Technique II (2)
Prereq: 103B or perm. required. Expanded balletic movement vocabulary with continued emphasis on basic technical skills. Musicality will be emphasized.

202B Ballet Technique II (2)
Prereq: 201B or perm. required. Continuation of 201B.

203B Ballet Technique II (2)
Prereq: 202B or perm. required. Further development of 202B.

201C Intermediate Composition (2)
Prereq: 103C or perm. Choreographic studies to enhance the student's understanding and appreciation of the creative process by developing the concepts of rhythm, space, and dynamics into longer, more detailed studies.

202C Intermediate Composition (2)
Prereq: 201C or perm. Continuation of 201C.

203C Intermediate Composition (2)
Prereq: 202C or perm. Further development of 202C.

211 Creative Listening for Dance (1)
This course affords opportunity for students to gain knowledge of different musical styles through exposure to a wide array of music listening experiences. Students are encouraged to share musical interests and tastes.

220 Dance Technique II (2)
Prereq: 120 or equiv. (A) modern dance, (B) ballet, (C) jazz.

231 Introduction to Dance Kinesiology (2)
Introduces student to basic anatomical materials, kinesiological concepts, and their relationship to production of dance movement.

240 Practicum in Teaching Dance I (1)
Prereq: perm. Observation and assistance in student teaching. May be repeated.

250 Ethnic Dance of Non-Western Cultures (2)
Dances from selected non-Western cultures with emphasis on style and related folklore.

255 Ethnic Dance of Western Cultures (2)
Dances from selected Western cultures with emphasis on style and related folklore.

271 Black Dance Forms (4) (2H)
A lecture and studio/lab course that will familiarize students with Black dance forms and the contributions that African Americans have made to the development of dance in America. Discussions, readings, videotaped material, live performances, and studio practice will all contribute to the students' experiential learning.

301A Modern Dance Technique III (3)
Prereq: 203B or perm. required. Refinement of technical skills through more complex movement patterns. Additional emphasis on performance, phrasing, dynamics, and spatial concerns.

302A Modern Dance Technique III (3)
Prereq: 203A or perm. required. Continuation of 301A.

303A Modern Dance Technique III (3)
Prereq: 302A or perm. required. Further development of 302A.

301B Ballet Technique III (2)
Prereq: 203B or perm. required. Employment of technical skills through more complex balletic patterns and expanded classical vocabulary. Additional emphasis on performance, phrasing, and dynamics.

302B Ballet Technique III (2)
Prereq: 301B or perm. required. Continuation of 301B.

303B Ballet Technique III (2)
Prereq: 302B or perm. required. Further development of 302B.

301C Advanced Composition (2)
Prereq: 203C or perm. The synthesis of choreographic elements, devices, and musical or sound choices into studies having a sense of form and content.

302C Advanced Composition (2)
Prereq: 301C or perm. Continuation of 301C.

303C Advanced Composition (2)
Prereq: 301C or perm. Further development of 302C.

310 Accompaniment for Dance (2)
Prereq: 111 or perm. Basic problems in accompanying dance and analysis of dance forms related to accompaniment.

311 Midi Composition for Dancers (3)
This course is about creating musical compositions using a computer sequencer and sample based synthesizers. The primary objectives are gaining a working knowledge of a MIDI and investigating the qualities and parameters that are basic to music composition and how they relate to dance composition and performance.

312 Music for Dance II (3)
Prereq: 111 or equiv. Also for music composition majors who wish to write for dance theater. History of music for dance. Choreographer-composer relationship.

313 Dance Notation I (3)
Prereq: perm. Principles of dance notation.

318 Collaborative Skills for the Dance Musician (2)
Technique and skill training for pianists in accompanying ballet and modern dance techniques classes. Includes class and lab sessions.

320 Dance Technique III (2)
Prereq: 220 or equiv. (A) modern dance, (B) ballet, (C) jazz.

330 Dance Movement Lab (1–5)
Prereq: perm. Addresses individual problems related to the production of movement. Means to augment physical function and expand the qualitative range of the mover are explored.

330A Pilates Reformer Training (1)
Designed to condition students using resistance training on the Universal Reformer and other Pilates apparatus. Students learn exercise principles and techniques on specialized equipment, focusing on correction of body alignment problems, muscle imbalances, strength, and flexibility.

330B Bartenieff Fundamentals (1)
Exploration and practice in a system of movement training designed to improve the functional and expressive aspects of movement.

330C Pilates Mat Training (1)
Includes laboratory practice of 45 mat exercises that train the muscles to improve body stability and mobility. The Pilates method develops precision coordination and concentration in movement while increasing strength and flexibility. Addresses injury rehabilitation from the perspective of preventive training.

331 Analysis of Dance Movement (4)
Prereq: 231. Explores skeletal alignment and deviation, muscular development and function, and mechanical efficiency in production of dance movement. Basic to course study is thorough understanding of principles of stability and motion as they relate to dance.

332 Fitness for the Whole Mover (2)
Introduces the basics of fitness in practice and theory. Strength, flexibility, aerobic conditioning, and relaxation as a part of the fitness continuum are explored through a variety of approaches to creating and attaining fitness goals.

333 Pilates Teaching Practicum (2)
This course is designed to provide supervised teaching experience and practice for students preparing to enter the Pilates Teacher Certification Program. Students will conduct practice teaching on all Pilates apparatus, learning body alignment, exercise prescription and prgress assessment techniques.

351 Dance Cultures of the World I (4) (2C)
Introduction to dance cultures of world (excluding Western art dance). Function of dance in society and its relationship to other arts.

352 Dance Cultures of the World II (4) (2C)
Same as 351.

353 Dance Cultures of the World III (4) (2C)
Same as 351.

370 Viewing 20th Century Dance (4)
Prereq: not open to students who have had 170; jr and above. Art of dance from broad point of view, involving dance viewing, literature, and participation. Deals with aesthetic, psychological, social, and cultural aspects.

380 Practicum in Dance Production (1)
Prereq: perm. Supervised lab practice in production and/or performance. May be repeated.

385 Dance Repertory (3, max 12)
Prereq: majors only, audition, and perm. Rehearsal and performance of choreographic works taught by choreographer or reconstructors with aid of videotape, film, and/or dance scores.

401A Modern Dance Technique IV (3)
Prereq: 303A or perm. required. Employment of technical skill to address the more subtle demands of performance focus, projection, expressivity, and dynamic range.

401B Ballet Technique IV (2)
Prereq: 303B or perm. required. Employment of technical skills and performance demands within the classical ballet tradition.

402A Modern Dance Technique IV (3)
Prereq: 401A or perm. required. Continuation of 401A.

402B Ballet Technique IV (2)
Prereq: 401B or perm. required. Continuation of 401B.

403A Modern Dance Technique IV (3)
Prereq: 402A or perm. required. Further development of 402A.

403B Ballet Technique IV (2)
Prereq: 402B or perm. required. Further development of 402B.

411 Dance Notation II (3)
Prereq: 313 or perm. Continuation of 313 with more advanced reading and writing in notation.

420 Dance Technique IV (2)
Prereq: 320. (A) modern dance, (B) ballet, (C) jazz.

431 Dance Kinesiology Seminar (2)
Prereq: 331. Assists student to construct anatomically sound and functionally effective dance class.

440 Practicum in Teaching Dance II (2)
Prereq: 240 and perm. Student teaching under supervision.

441 Teaching Dance I (3)
Prereq: perm. Principles of teaching dance and their practical application. Dance for children.

442 Teaching Dance II (2)
Prereq: at least 1 qtr of 240; coreq with 440. Principles of teaching dance and their practical application. Dance for adolescents.

443 Teaching Dance III (2)
Prereq: at least 1 qtr of 240; coreq with 440. Principles of teaching dance and their practical application. Dance for adults.

460 Senior Seminar (2)
Prepares students for the field of dance and related careers. Skills in writing, networking, and oral presentation, as well as the ability to access available resources, are refined.

471 History of Dance I (4) (2H)
Development of Euro-American dance in the 20th century with focus on contemporary dance through the present.

472 History of Dance II (4) (2H)
Global dance forms: Study of dances in historical and cultural contexts, their functions in society and relationships to contemporary artistic expressions. Focus on topics from traditional and recent research in world dance.

473 History of Dance III (4) (2H)
Development of Euro-American dance from classic times through 20th-century ballet, with emphasis on Baroque, Romantic, and Diaghilev periods.

480 Production Problems for Dance Theater (3–6, max 6)
Prereq: perm. Includes choreography, performance, and production aspects of senior projects and other dance events.

488 Dance Choreography and Video Techniques (2)
Prereq: perm. Designed to increase awareness of the possibilities of video in dance, both as

a recording tool and a creative tool. The basics of video production and digital editing will be introduced in order for dance choreographers to become familiar with video technology applicable to dance.

490 Independent Study (1–10)
Prereq: perm.

494 Internship (1–16)
Prereq: perm. Provides credit for internship experience in which some dance majors may participate. Internship allows individual to gain actual experience in field of dance and related areas, e.g., apprentice/performing, technical production, arts administration.

495 Special Topics in Dance (1-4)
Special topics relating to the choreography, technique, production elements, or aesthetics of historical or contemporary dance forms.

Deaf Studies and Interpreting (DSI)

The following courses for the proposed A.A.S. in deaf studies and interpreting are available only on the Chillicothe campus:

111 Sign Language and Deaf Culture I (4)
Different types of deaf and the different languages utilized by each. Includes signing paragraphs, using ASL, PIDGIN, and SEE, studying culture, and participating in short community-based research projects.

112 Sign Language and Deaf Culture II (4)
Prereq: 111. Continuation from 111 of deaf languages and culture. Includes more than 300 additional signs, continuing to use ASL, PIDGIN, and SEE, reverse interpreting paragraphs, and studying idioms and slang terms.

113 Sign Language and Deaf Culture III (4)
Prereq: 112. Continuation from 112 of deaf languages and culture. Includes additional signs, continuing to use ASL, PIDGIN, and SEE, further reverse interpreting of paragraphs, and translating idiom and slang paragraphs. Discusses deaf in mental institutions, prisons, and the court system. Students interpret for University functions and programs.

120 Introduction to Deaf Studies and Interpreting (1)
First of three assessments in deaf studies and interpreting degree program, evaluating knowledge of various sign languages used, types of deaf people using each of the sign languages, cultural aspects of deafness, speed in signing, comprehension speed, and interpreting and reverse interpreting skills. Offers basic introduction to knowledge and skills required for successful completion of the degree. Covers history of interpreting, career opportunities, ethical considerations, and includes discussion of program courses, seminar paper, and second and third assessments.

161 Orientation to Deafness (3)
Broad overview of field of deafness, focusing on education perspectives, psychosocial precepts, communication modes, vocational opportunities, support services, and recent technological advances. Benefits parents, educators, vocational rehabilitation counselors, interpreters, and other professionals who come into contact with the deaf and hearing impaired community.

191 Interpreting as a Profession (1)
Prereq: 120. Second of three assessments in deaf studies and interpreting degree program, requiring 50-60 percent improvement from 120 in speed in signing, knowledge of culture, and interpreting and reverse interpreting skills. Includes introduction to practicums, professionalism of interpreting (dress, demeanor, professional organizations), national certification, and ethics of the profession and their impact on personal views.

211 Sign Language and Deaf Culture IV (4)
Prereq: 113. Additional signs and advanced usage of previous signs from first-year sequence. Includes interpreting for University functions, community meetings, and business situations.

212 Sign Language and Deaf Culture V (4)
Prereq: 211. Signs beyond 211 and a larger role in interpreting situations. Additional cultural information (family relationships, sexual relationships, and more) enhances abilities to work with and for the deaf in any context.

213 Sign Language and Deaf Culture VI (4)
Prereq: 212. Signs beyond 212 and specific interpreting within community. Includes cultural information such as family dynamics, time orientation within mental health situations, and ethics for interpreting. Covers sexual signs, regional signs, and idioms specific to area.

221 Practicum I (2)
Prereq: advanced standing, perm. Opportunity to work in teaching, training, and/or interpreting situations under supervision. Provides experience in program development and deals with professionalism in interpreting. May include student-teaching sign language classes within community and businesses, observation of professional interpreters, and critiques of videotaped interpreting situations.

222 Medical Personnel and the Deaf (4)
For those in the emergency care field or studying to be an interpreter. Covers 150 essential signs for immediate communication, different types of deaf, different sign languages, working with deaf family members, legal issues for hospitals and nursing homes, sexual signs involved in rape cases and abuse, cultural issues working with male/female deaf, and more.

224 Interpreters and Interpreting (3)
World of interpreting for the deaf, including detailed code of ethics and responsibilities imposed on those who interpret in all fields: platform interpreting, educational interpreting, medical interpreting, religious interpreting, etc. Discusses interpreter role within the courtroom, including the interpreter oath and its significance to the court, the interpreter, and the deaf.

226 Practicum II (2)
Prereq: advanced standing, 221. Opportunity to interpret for the deaf without immediate supervision, extending knowledge of interpreting in specific contexts. Ability to work within community is enhanced through responsibility for teaching basic sign language classes and through critiques of videotaped interpreting situations.

260 Critical and Traumatic Situations (3)
Sexual abuse of deaf children, including causes, incident rate, interviewing techniques, investigation problems, and involvement of law enforcement agencies, schools, hospitals, DARE, and crime prevention programs. Also discusses deaf in disaster situations, emergency response centers, first responders, and problems of victimization of deaf in research projects.

286 Study of Deaf Culture (3)
Sociocultural aspects of deafness, addressing issues of deaf communities such as leadership roles, political activity, and organization. Examines the functioning of deaf within social institutions.

288 Seminar in Deaf Studies (2)
Prereq: advanced standing, perm. Scholarly paper of no less than 50 pages is required for completion of the associate's degree in deaf studies and interpreting. Involves choosing research topic related to field of work, and engaging in library research, interviews, questionnaires, and other forms of inquiry.

291 The Professional Interpreter (1)
Prereq: 191. Third and final assessment in deaf studies and interpreting degree program, serving as a capstone. Requires 45%-50% improvement from 191 and the ability to interpret effectively in any situation for any of the three types of deaf. Covers introduction to Web sites regarding deaf, resume preparation for job interviews (including role plays), discussion and evaluation of past and current assessments, and in-depth review of ethics of interpreting and the Americans with Disabilities Act.

298A-E Special Topics (1-4, max 12)
Opportunity to explore topics related to deaf studies either on an individual basis or in a structured course.

Design Technology (DTCH)

The following courses are available only on the Lancaster campus:

100 Introduction to Industrial Technology (3)
Overview of design and manufacturing options. Topics include machining, welding, steel production, quality control, interrelation of processes, design concepts, materials, mechanisms, and structures. Plant tours, lab work, and projects involved. Recommended for students having little or no background in mechanical design or manufacturing. 2 lec, 2 lab.

150 Computer Aided Drawing (3)
Prereq: IT 101 or perm. Introduction to use of computers for making engineering drawings. Uses software for personal computers to create multiview drawings of machine parts and other projects selected by student. No computer background required. 6 lab.

200 Engineering Mechanics I (4)
Prereq: MATH 115 or perm. Basic statics and dynamics. Coverage includes vectors, Newton's laws, trusses, frames and machines, friction, moments of inertia, particle kinematics and kinetics, work-energy, impulse-momentum. 4 lec.

210 Engineering Mechanics II (4)
Prereq: 200 or perm. Introduction to strength of materials. Axial, torsional, and flexural loadings; plane stresses; beams; columns; deflections; statically indeterminate systems; testing methods. 3 lec, 2 lab.

220 Machine Design (3)
Prereq: 210 or perm. Design of machine elements. Shafts, brakes, clutches, belts, couplings, bearings, springs, gears, fasteners, splines, and keys. Stresses in machine parts, materials applications. 3 lec.

240 Mechanisms (4)
Prereq: 200 or IT 121, or perm. Design and analysis of simple mechanisms. Kinematics and kinetics of rigid bodies, graphical analysis of force, velocity and acceleration problems, linkages, instantaneous centers, gear trains, cams, rolling contact. 1 lec, 6 lab.

250 Structural Design (4)
Prereq: 210 or perm. Design of structural components in buildings. Foundations, connections, materials selection, use of industry standards. 1 lec, 6 lab.

299 Special Problems (1–3, max 6)
Prereq: perm. Individual projects or internship experiences under direction of faculty member in design option.

Ecology

See Biological Sciences or Environmental and Plant Biology.

Economics (ECON)

103 Principles of Microeconomics (4) (2S)
Prereq: MATH 101 or higher math placement. Basic theory and economic analysis of prices, markets, production, wages, interest, rent, and profits. Analysis of how the capitalistic system determines what, how, and for whom to produce.

104 Principles of Macroeconomics (4) (2S)
Prereq: 103 and MATH 101 or higher math placement. Basic theory of national income analysis. Causes of unemployment and inflation. Monetary and fiscal policies of the federal government.

213 Current Economic Problems (4)
Prereq: 103 and 104. Application of economic theory to current economic problems with emphasis on public policy implications.

300 Mathematics for Economists (4)
Prereq: 103 and 104 and perm. Mathematical analysis in economics. Calculus and matrix algebra techniques used prominently in economics literature, together with their application to selected problems in economics.

303 Microeconomics (4)
Prereq: 103 and 104. Price system as allocative mechanism. Price and production policies of individual firms and consumers under alternative market conditions and analysis of these policies on social efficiency of resource allocation. Students expected to have understanding of elementary algebra and geometry.

304 Macroeconomics (4)
Prereq: 104, jr; soph if major. Factors determining level of nation's economic activity and responsible for growth and stability in nation's economy. Part of course devoted to measures of national income while remainder consists of analysis of interrelationships among production, price levels, relative prices, employment, and capital formation. Students expected to have understanding of elementary algebra and geometry.

305 Managerial Economics (4)
Prereq: 103, QBA 201, and MATH 163A. Analysis of decision making in enterprise; market environment; measurement of influence of policy and nonpolicy variables on sales and costs; sales, cost, and profit forecasting; empirical studies of market structure and pricing; includes regression analysis.

307 History of Economic Thought (4)
Prereq: 103 and 104. Evolution of major economic doctrines: mercantilists, physiocrats, Adam Smith and classical school. May also cover historical school, Austrian school, Alfred Marshall and neoclassicists.

312 Economics of Poverty (4)
Prereq: 103 and 104. Incidence, causes, and consequence of poverty in affluent society. Economic theory, history, statistics applied to analysis of poverty-reduction measures.

313 Economics of the Environment (4)
Prereq: 103. Economic analysis of such environmental matters as air, water, and noise pollution, population growth, and land use. Emphasis placed on use of economic theory and empirical research in evaluating environmental policies.

314 Natural Resource Economics (4)
Prereq: 103, MATH 163A. Explores the economic aspects involved in the extraction and utilization of both renewable and nonrenewable natural resources. Topics include the economics of oil and mineral extraction, groundwater use, agricultural practices, forestry, and fisheries. It also examines the allocation of property rights and economic benefits and costs of natural resource use.

315 Economics of Health Care (4)
Prereq: 103 and 104. Demand for medical care, supply behavior of profit and nonprofit agencies, market structure, adverse selection, public and private health insurance.

316 Economics and the Law (4)
Prereq: 303 or 305 or perm. Major topics are property, contracts, and torts. Class time is divided between economic analysis of these topics in the abstract and actual legal cases that involve these topics.

320 Labor Economics (4)
Prereq: 103. Demand for labor, supply of labor, household production, compensating wage differentials, education and training, discrimination, unions, and unemployment.

322 Economics of Human Resources (4)
Prereq: 103. Investigation of the decisions individuals and families make regarding education, marriage, fertility, labor supply and child care as well as the effects of public policy on these decisions.

332 Industrial Organization (4)
Prereq: 303 or 305. Market structures, market conduct, and social performance of industries. Emphasis upon firms' strategic behavior in price and nonprice competition. Topics include oligopolistic pricing, strategic entry deterrence, location strategies, product quality, advertising, and research and development. Economic welfare implications of firms' behavior examined.

334 Economics of Antitrust Law (4)
Prereq: 303 or 305. Explores the economic behavior of the firm subject to antitrust laws. Topics include collusion, price discrimination, vertical restraints, and other behavior where the intent may be to monopolize a market. Also examines institutional incentives and economic benefits and costs of antitrust laws.

335 Economics of Energy (4)
Prereq: 103. Applies economic theory to analyzing public policy issues regarding energy production and use—including such topics as price controls, import dependency, conservation, supply outlook, and industry concentration.

337 Government Regulation of Business (4)
Prereq: 303 or 305 or perm. Why does the government regulate business? Reasons include the inefficiencies of market power, considerations of fairness, excessive competition, natural monopoly, externalities, and reducing transactions costs.

340 International Trade (4)
Prereq: 103. International trade patterns, theories of absolute and comparative advantage, classical and modern trade theory, tariffs, quotas, nontariff barriers, preferential trading arrangements.

341 International Monetary Systems (4)
Prereq: 104. How exchange rates are determined, fixed vs. flexible rates, government intervention, fiscal and monetary policy in open economy, transmission of inflation and unemployment among nations, international capital movements, covered interest arbitrage, forward exchange, Euro-currency markets.

342 International Economic Policy (4)
Prereq: 340 or 540. Current economic developments of foreign and U.S. economic policy. Commercial treaties and tariff policy; exchange rate instability; balance of payments problems including LDC debt situation; international liquidity issues; trade relations among industrial, underdeveloped, and Soviet-bloc countries; multinational corporations; roles of institutions such as World Bank, International Monetary Fund, and GATT.

350 Economic Development (4)
Prereq: 103 and 104. Nature of, obstacles to, and future possibilities for economic growth of nations. Special emphasis given to problems of underdeveloped countries. Studies of selected countries.

351 Agricultural Development (4)
Prereq: 103 and 104. Patterns of agricultural development: technological and demographic changes in agriculture; socioeconomic problems; marketing arrangements; case studies of specific agricultural development projects.

352 Economic History of the United States (4)
Prereq: 103 and 104. Economic factors in development of U.S. including historical growth of economic institutions such as banking, manufacturing, labor unions, and agriculture, from colonial times to present.

353 European Economic History (4)
Prereq: 103 and 104. Economic growth of developed countries. Focus on industrial revolutions in Great Britain, France, Germany, and the former Soviet Union. Historical experience of these countries related to various theories of economic change.

360 Money and Banking (4)
Prereq: 104. Role of money and banking system in determination of national income and output. Monetary theory and policy emphasized.

370 Comparative Economic Systems (4)
Prereq: 103 and 104. Theoretical and institutional characteristics of capitalism and socialism with specific emphasis on prevailing economic systems in U.S., Great Britain, and the former Soviet Union.

381 Introduction to Economic Statistics and Econometrics (4)
Prereq: 103 and 104. Statistical methods are developed within an economic context. Fundamental statistical topics include descriptive statistics, basic probability theory, random variables, sampling, estimation, and hypothesis testing.

382 Economic and Financial Analysis with Statistical Packages (4)
Prereq: 104 and either 381 or QBA 201, PSY 221, POLS 482, or MATH 250/251. SAS language, using real life small and large data sets and applying SAS procedures to conduct statistical and finacial analysis of economic and business data. Interpretation of statistical output of estimated functions and written reports for rational decision making using business and economic analysis.

385 An Introduction to Economic Methodology and Research (4)
Prereq: 303 (or 305), 304, 381, or equiv. Methods used by economists in investigation of economic problems. First part involves research methods, including contemporary statistical estimation techniques. Second part applies these techniques to investigation of economic phenomena. Types of application include construction and testing of simple econometric model, estimation of production functions, evaluating theories of factor pricing, estimating social costs of pollution, etc.

406 Monetary Theory and Policy (4)
Prereq: 303 (or 305) and 304. Emphasis on monetary economics. Money demand and supply theory and policies for minimizing cyclical fluctuations in economic activity.

425 Public Policy Economics (4)
Prereq: 104. Survey of economic approach to analyzing public policy issues. Uses concepts of welfare economics, public choice economics, and cost-benefit analysis, as applied to sample of policy subjects.

430 Public Finance (4)
Prereq: 303 or 305 or perm. Role played by government as user of economic resources and redistributor of incomes. Some questions explored: need for government's entry into economy, optimal size of government, selection of tax and expenditures schemes, and effects of government economic activity on private sector.

431 Economics of Transportation (4)
Prereq: 303 or 305. Economics of transport pricing; regulations of transport and national transport policy.

444 Futures Markets (4)
Prereq: 360 or FIN 327 or perm. Contracts, trading, institutions, and strategies, including hedging and speculation. No credit if FIN 444 taken.

455 African Economic Development (4)
Prereq: 350 or perm. Economic characteristics of African societies as traditional economies and in process of modernization.

473 Economics of Southeast Asia (4)
Prereq: 350 or perm. Economic characteristics, development problems, strategies, and prospects of countries of Southeast Asia.

474 Economics of Latin America (4)
Prereq: 350 or perm. Economics of Latin American countries, prospects for economic development of the region, nature and origin of institutional obstacles to economic change. Economic heritage of colonial period and subsequent evolution of economic institutions, resources of the area and utilization, and trends in economic activity and policy in post–WWII period.

482 Topics in Econometrics (4)
Prereq: 303 or 305, 381, MATH 163A or calculus, or perm. Basic linear regression models are explored within an econometric context. Simple and multiple linear regression models are introduced under classical assumptions and developed in relation to heteroskedasticity, autocorrelation, multicollinearity, and specification errors. Models with binary regressors, models with qualitative dependent variables, and the simultaneous equations model are introduced. Computer assignments provide experience in empirical social science research.

491 Seminar (3–5)
Prereq: perm. Selected topics of current interest in economics area.

493 Readings (1–15)
Prereq: perm. Readings in selected fields of economics. Topics selected by student in consultation with faculty member.

493X Readings (1–15)
Prereq: perm. Study abroad.

495 Research (3–5)
Methodology, analysis of data, and preparation of research findings.

497 Independent Research (1–15)
Prereq: perm. Research in selected fields of economics under direction of faculty member.

Education

All programs and courses in the College of Education satisfy the standards of the Ohio State Department of Education and NCATE. Consult your advisor regarding program requirements and scheduling. In particular, note that some pairs or groups of professional education courses must be taken concurrently. Address questions to Student Services, McCracken Hall 124.

Each course in education may be taken no more than twice.

Counselor Education (EDCE)

201 Career and Life Planning Seminar (3)
Designed to provide knowledge and skill in career and life planning for fr and sophs, especially for those who are undecided about college major and career. Emphasis on identifying strengths, clarifying values, exploring career options, and developing decision-making skills. Special section for Adult Learning Services students only: designed to provide knowledge and skill in career and life planning especially for adult considering job or career change. Emphasis on identifying skills, interests, experience, and values in relationship to new career choices and options.

400 Special Topics in Guidance, Counseling, and Student Personnel (1–5)
Prereq: perm. Independent studies, specialized projects, and seminars on following special topics: alcohol and substance abuse; biofeedback, self-control, and management of stress; marriage and family issues; assertiveness; human sexuality; and Adlerian theory, method, and research (may be repeated for max of 18 hrs).

410 Human Relations (3)
Prereq: jr. Study and practice of developing healthy and mutually satisfying interpersonal relationships. Lecture and discussion groups focus on dynamics of human relationships, factors fostering effective interaction, and significance of self concepts in human communication. Topical headings include value clarification, games people play, self disclosure and trust, conflict resolution, sexuality, prejudice, death and dying, multicultural education, sexism, constructive use of anger, etc.

420 Guidance Practices in Elementary Schools (4)
Need, scope, and nature of elementary guidance surveyed. Guidance approaches and procedures examined for their usefulness in working with children and parents. Roles of elementary school counselor and other pupil personnel specialists reviewed for their contribution to growth and development of children. Opportunity for students to achieve greater self-understanding through involvement in self-appraisal.

430 Guidance in American Secondary Schools (4)
Same as 420 but pertains to secondary schools.

440 Foundations in Group Dynamics (4)
General principles and basic techniques of group dynamics. Interaction in human relations situations that occur in agency settings, business, classrooms, community, resident living, and various types of professionally led training, counseling, and growth groups. Through both cognitive and affective learning opportunities, students learn to understand and use group dynamics principles in areas of personal and professional interaction. Students attend weekly cognitive seminars as well as participate in ongoing group lab.

Curriculum and Instruction (EDTE)

100 (1)
An introduction to teaching as a profession.

101 Democracy and Education (4)
Prereq: admission to CARE program. Coreq: 101L. An introduction to the unique role American public schools play in preparing citizens for democracy. Particular attention will be paid to the role of the teacher in the process, as well as to historical and sociological precedents.

101L Democracy and Education: Field Experience (2)
Prereq: admission to CARE program. Coreq: 101. Field experiences to complement EDCI 101 Democracy and Education. Will involve several school placements at differing classroom levels to promote comparison and analysis.

200 Learning, Human Growth, and Development (6)
Prereq: Admission to Professional Education. Coreq: 201, 202. Provides a general knowledge about human learning as it relates to the life cycle from birth to young adulthood. Designed to provide preservice teachers with a fundamental knowledge of human growth and development (physical, social, affective, and cognitive) and theories of learning.

201 Characteristics of Learners with Exceptionalities (3)
Prereq: Admission to Professional Education. Coreq: 200, 202. Covers a range of topics in the special education process, including identification, referral, assessment procedures, service delivery options, parental involvement, the law and legal issues, supports for inclusion, roles of agency and related service personnel, and characteristics of all types of learners with exceptionalities, including gifted, from preschool through young adulthood. No credit for both 201 and EDSP 271.

201ABC Childhood in America (4)
Prereq: 101. Introduces students to children and their characteristics at various levels of development. Students are also introduced to and encouraged to examine factors that influence children's learning in the schools, such as families, neighborhoods, race, culture, gender, and socioeconomic status. Students examine values and belief systems of themselves and children, as well as identify elements of successful parenting.

202 Field Experience in Education (2)
Prereq: Admission to Professional Education. Coreq: 200, 201. Students apply principles of typical child development, learned in 200, and exceptional development of children and youth, learned in 201, as they observe, assist, adapt tests and lessons, and tutor a diverse range of pupils in a field setting.

210 Introduction to Teaching in a Democratic Classroom (4)
Prereq: 101. Coreq: 210L. The purpose of this course is to identify the characteristics of a democratic classroom and to develop student skill in the creation of a democratic learning environment. Students examine a variety of teaching models including explicit teaching and cooperative learning, and begin to develop competence in their use.

210L Introduction to Teaching in a Democratic Classroom Field Experience (2)
Prereq: 101. Coreq: 210. This practicum accompanies EDTE 210 and provides students with field experience in the classroom. Classroom assignments include observation, tutoring, small-group instruction, and other appropriate preservice experiences.

220 Phonics and the Structure of Language (5)
Prereq: admission to Professional Education. Course provides information and training in the foundations of phonics instruction. It explores the historical, linguistic, and instructional framework related to phonics skill development.

310 Advanced Methods for the Democratic Classroom (4)
Prereq: admission to CARE program and 210. Coreq: 310L. In-depth exploration of several teaching methods utilized in progressive, democratic classrooms. Builds on introduction to these methods in EDTE 210.

310L Advanced Methods for the Democratic Classroom Lab (2)
Prereq: admission to CARE program. Coreq: 310. Field experience utilizing methods gained in EDTE 310.

325 Literature-Centered Developmental Reading Instruction (5)
Prereq: 220, adv standing. Provides preparation for teaching of developmental reading in the middle school. The course emphasizes a literature-centered approach to the teaching of reading and emphasizes the development of proficient reading through a stage model of reading. Text and supplementary readings, lecture, demonstration, discussion, multimedia resources, observations and participation in schools, and projects for practical competence are all part of the class procedures.

331J Educational Research Techniques and Writing (4) (1J)
Prereq: jr. Concentration upon communication skills of reading, writing, and speaking, utilizing educational writings dealing with history of education, philosophy, psychology, sociology, and current issues. Development of critical reading, effective writing, and speaking skills.

371A Instructional Adaptations for Learners with Exceptionalities and Diverse Needs—Middle (4)
Prereq: 200, 201, 202. Designed to develop skills needed by educators at the elementary and middle levels to work with learners with exceptionalities and diverse needs in inclusive classrooms. Content includes curriculum modifications, instructional and management adaptations, effective collaboration strategies, accessing related and support services, and skills required for instructing in and managing an inclusive classroom.

371B Instructional Adaptations for Learners with Exceptionalities and Diverse Needs—Secondary (4)
Prereq: admission to adv standing. This course and clinical/field experience are designed

to develop skills needed by educators at the adolescent to young adult level in order to work with learners who have exceptionalities and diverse needs in inclusive classrooms. Content includes curriculum modifications, selection and appropriate uses of reading materials, instructional and reading adaptations, classroom management adaptations, effective collaboration strategies, accessing related and support services, and skills required for instructing and managing an inclusive classroom.

371C Instructional Adaptations for Learners with Exceptionalities and Diverse Needs—Early (4)
Prereq: Professional Education and EDSP 271. Designed to develop skills needed by early childhood educators to work with families and learners who have exceptionalities and diverse needs in inclusive classrooms. Content includes curriculum modification, instructional and management adaptations, effective collaboration strategies, accessing related and support services, and skills required for instructing and managing an inclusive classroom.

420 Teaching Reading in the Content Area (4)
Prereq: adv standing. Materials, methods, and techniques for teaching adolescent learners of various abilities. Emphasis on diagnosis of reading difficulties and adaptation of materials and teaching methods for content area instruction. Lab included as part of the lecture class.

421 Foundations of Reading Instruction, Diagnosis, and Remediation for Classroom Teachers (4)
Prereq: 220, adv standing. Designed to provide classroom teachers a theoretical and practical understanding of the foundations of reading instruction, diagnosis, and remediation. An exploration of these foundations as they affect a wide diversity of students. Includes practical hands-on opportunities for evaluating, assessing, and remediating one student's reading ability.

422 Diagnosis and Treatment of Reading Disabilities (4)
Prereq: EDSE 420 or EDCI 421 or EDEC 421. Correlates of variability in reading proficiency. Incidence of retardation and disability. Proposed causes of failure and concept of multiple causation. Specialized materials and instructional efforts. Systematic observation of causes of reading disability and preparation of case report.

423 Reading Laboratory Practicum (4, max 12)
Prereq: sr, 422. Application of developmental approach to problem cases in reading instruction, participation in diagnostic examination, parent and teacher conferences, individual procedures in tutoring, staffing of cases and preparation of report (weekly group discussion period, lab sessions arranged).

465 Introduction to Teaching the Talented and Gifted (4)
Provides introduction to rationale, scope, and nature of concerns relative to education of gifted youth. Attention given to overview of problems and issues; including (A) societal factors that influence programs, (B) characteristics and identification of gifted youths, and (C) current and recommended programs.

492 Workshop in Curriculum and Instruction (0.5–15)
Prereq: perm. Staff. Designed to provide practicing teachers and other instructional personnel with in-service education directed toward their identified needs. Facilitates offering of short courses, work-shops, and summer institutes. Areas of concentration currently available: (A) Language Arts, (B) Social Studies, (C) Science, (D) Mathematics, (E) Reading, (F) Kindergarten, (G) Individualizing Instruction, (H) Team Teaching, (I) Interaction Analysis, (J) Developing Behavioral Objectives, (K) Curriculum Development, (L) Interdisciplinary Topics, (M) Special Topics, (N) Special Education Topics, (O) Supervision of Instruction, (P) Education for Gifted.

492K Workshop in Curriculum and Instruction (2)
Prereq: 101, 210, 310. An in-depth examination and synthesis of information learned in both special CARE classes and in general education classes with emphasis on how this information can be used in the classroom and integrated into the future teacher's teaching strategies.

Education Cultural Studies (EDCS)

301 Education and Cultural Diversity (3)
Prereq: admission to Professional Education. Requires students to observe, analyze, and reflect upon the advantages and problems associated with teaching in a culturally diverse environmnet. Students study the influences of cultural diversity on education in the United States and develop the skills and attitudes that help them adjust curriculum and instruction to culturally diverse groups.

400 School, Society, and the Professional Educator (4)
Studies the social, philosophical, ideological, and historical foundations of K-12 education in the United States as they apply to both practical and theoretical issues for the professional educator. Four questions guide inquiries into the foundations of education: Why do we educate? For whom is education intended and designed? What are the personal, social, and cultural effects of education? Who bears the institutional responsibility for education?

Education Computer Technology (EDCT)

203 Technological Applications in Education (4)
Prereq: Admission to Professional Education. Focuses on the use of technology to increase the effectiveness, efficiency, and appeal of instruction to diverse learners. Major emphasis is given to instructional computing for production and presentation.

Early Childhood Education (EDEC)

206 Introduction to the Integrated Curriculum (4)
The purpose of this course is to introduce the undergraduate students in early childhood to the integrated curriculum for young children between the ages of three and eight years. The relationship among how young children learn, what they find in their environment and the integration of their curricula is examined.

225 Emergent Reading and Literacy (4)
Prereq: EDCI 220. Emphasizes the development of reading and literacy from a global view of language, thinking, and learning. Attention is given to methods and materials with emphasis on the use of literacy within the framework of age and individual appropriateness.

306 Teaching Strategies and Transitions for Young Children (3)
Prereq: adv standing.

319 Reading and Literature in the Early Childhood Classroom (5)
Prereq: EDCI 220. Designed for undergraduate students seeking licensure in early childhood. Focuses on the development of reading and the role of literature in that process.

330 Teaching Young Children Mathematics (3)
Prereq: jr., admission to Professional Education. Coreq: 330L. Examination of methods and materials appropriate for teaching mathematics to young children. Emphasis placed on using developmentally appropriate experiences to provide for diversity of learners, including those with disabilities. Designed to be taken concurrently with 330L.

330L Teaching Young Children Mathematics—Field (1)
Coreq: 330. Application of concepts and skills from EDEC 330. Students observe and teach mathematics lessons in appropriate settings under the supervision of the course instructor. Students demonstrate proficiency in the use of mathematical models and manipulative teaching aids.

340 Teaching Science for Young Children (4)
Prereq: adv standing in teacher education; 12 hours of science; completion of one course in each of the following science areas: Life, Physical, Earth. Coreq: EDEC 340L. Emphasis on constructivist science teaching through hands-on inquiring processes. National Standards examined and applied. Science equipment, instructional resources and technology, and safety procedures emphasized.

340L Teaching Science for Young Children—Lab (1)
Coreq: 340. Will apply material learned in 340 in lab setting.

350 Teaching Social Studies in Early Childhood (3)
Prereq: Early Childhood major, adv standing. Coreq: 350L. The foundation of social studies is to help students gain new understandings of the world through discourse and activities which emphasize applications to authentic issues and problems of human society. Problem solving, critical thinking, analysis, negotiation and collaboration are part of the teaching of social studies.

350L Teaching Social Studies in Early Childhood—Field (1)
Prereq: Early Childhood major, adv standing. Coreq: 350. Field experience in classrooms for three year olds through third grade. Will apply the theory and application learned in 350 throughout the quarter.

421 Observing Young Children for Reading Strategies and Skills (2)
Prereq: 225, EDTE 220. Coreq: 421L. Learn to observe children, keep running records and conduct an informal reading inventory. Appropriate instruction is based on these assessment procedures. Learn to record results for reporting to parents and other appropriate adults.

421L Observing Young Children for Reading Strategies and Skills —Lab (2)
Coreq: 421. Lab experience accompanying 421.

Educational Administration (EDAD)

452 Problems in Administration of Education (1–4)
Prereq: perm. Variable topic course for independent study, institutes, and workshops.

Educational Media (EDM)

201 Use of Library Resources I (3)
Designed to acquaint students with resources available in academic library. Students learn analyze information needs and to develop systematic approach toward solution.

397T Media Tutorial (1–15)
Prereq: Honors Tutorial College and perm.

International and Comparative Education (EDIC)

205 Learning from Non-Western Cultures (4)
Prereq: soph or perm. Exploration of alternative "ways of seeing" and "ways of knowing," esp. in cultures of the non-Western world (i.e., Africa, Asia, Latin America). Building skills in personal investigations of life and learning in other cultures.

420 Comparative Cultures and Education (4)
Prereq: perm. Emphasis on distinctive cultural, economic, and political forces which shape patterns, problems, and roles of education in some selected developed and developing nations. These include U.S., some European countries, and at least one African and/or Asian nation where former or present Western culture has impact. Assessment of this impact especially on educational developments.

425A Education and Development in Africa (4)
Prereq: perm. Interdisciplinary course focusing on tradition and change in African societies, problems of political independence, economic development, cultural values in transition, tribalism and nationalism, and role of Africa in world peace and international cooperation. Tradition and change in African education, landmarks in African educational developments, and role of education in economic and technological development. Issues and problems in African education.

425B Education and Development in Asia (4)
Prereq: perm. Same emphasis as 425A on tradition and change in society, culture, and education, and role of education in national development and international understanding; discussion of pertinent educational issues and problems.

425C Education and Development in Latin America (4)
Prereq: perm. Same emphasis as 425A–425B on tradition and change in society, culture, and education, and role of education in national development and international understanding; discussion of pertinent educational issues and problems.

450 Teaching Strategies for Cultural and International Understanding (4)
Prereq: sr, perm. Psychological and sociological foundations of cultural values and ways of life investigated. Strategies for developing cross-cultural understanding and cooperation studied. Emphasis on innovative approaches to learning for elementary and secondary school pupils.

Middle Childhood Education (EDMC)

300 Middle Childhood Instructional Process and Curriculum (4)
Prereq: admission to adv standing. Furthers understanding of the middle child and the middle school. Lecture, activities, and field experiences revolve around developmentally appropriate teaching, context based assessment, supportive learning theory and application, and structure of the middle school.

301 Middle Childhood Education and Curriculum (5)
Prereq: 300. Specifically designed for middle childhood preservice teachers with a focus on social foundations of teaching and learning, with emphasis on middle childhood curriculum, middle school organization, and structure.

310 Teaching Language Arts in the Middle Childhood Grades (4)
Prereq: 300 or 301. Provides basic information in language development, oral and written language, and language mechanics. Provides strategies for teaching the language modes through an integrated approach. Stresses assessment in authentic settings.

310L Teaching Language Arts in the Middle Childhood grades (lab 1)
Coreq: EDMC 310. Lab experience accompanying 310.

321 Children's Literature for Middle Childhood (4)
Prereq: admission to adv standing. This course treats the body of literature by genre, appropriate for children from eight to fourteen years. It includes various techniques for utilizing children's literature in school settings.

330 Teaching Mathematics in Middle Childhood Grades (4)
Prereq: 300 or 301, admission to adv standing. Coreq: 300L. Familiarizes preservice educators with the mathematics curriculum of grades 4–9 and with instructional techniques appropriate for the delivery of the curriculum. The course provides a solid foundation in teaching and learning applied to mathematics, complemented by rich experiences in working with students in actual school settings. Designed to extend preservice teachers' understanding of mathematical content and methodology so that mathematics instruction is seen in terms of active students making appropriate use of technology in learning math as a relevant and coherent body of knowledge, which relates to diverse cultures. The course is designed to be taken concurrently with middle childhood lab course.

330L Teaching Mathematics in Middle Childhood Grades–Field (1)
Coreq: 330. Application of concepts and skills from 330. Observe and teach mathematics lessons in appropriate settings under the supervision of the course instructor. Demonstration of proficiency in the use of mathematical models and manipulative teaching aids.

340 Teaching Middle-Level Science (4)
Prereq: 300 or 301; 22 hrs in science. Coreq: 340L. Emphasis on concepts and inquiry processes for middle-level children as recommended by the National Science Education Standards. Topics include scientific literacy; applied constructivist learning theory; multicultural, gender, and exceptional learner equity practices; authentic assessment of the middle-level learner; safety and classroom management; uses of curriculum supplements and multimedia resources; effective questioning skills; and selection of appropriate uses of texts and demonstration.

340L Teaching Middle-Level Science–Lab (1)
Coreq: 340. Lab experience accompanying 340.

350 Teaching Social Studies in Middle Childhood Grades (4)
Prereq: 300 or 301. Coreq: 350L. The foundation of social studies is to help students develop new understandings of the new world through discourse and activities that emphasize applications to authentic issues of human society. Problem solving, critical thinking and analysis, negotiation and collaboration are part of the teaching of social studies content. Using national and state standards, course emphasizes integrated social studies for curriculum organization in grades 4-9.

350L Teaching Social Studies in Middle Childhood–Lab (1)
Prereq: 300 or 301. Coreq: 350. Field experience in 4th-9th grade classrooms will apply the theory and application learned in 350 throughout the quarter.

490 Independent Study (1–5)
Prereq: adm to EDMS Program, jr. Independent study provides the student an opportunity to focus on some special interest, concern, problem, research, and/or advanced study in a particular field under staff guidance. Suggested readings and other resources depend upon need and interest of the individual; frequent conferences; preparation of final report.

Professional Laboratory Experience (EDPL)

360 Field Experience in Elementary or Secondary Schools (2)
Prereq: jr, perm. Observation and participation in elementary and secondary schools. Prior approval must be secured from Field Experience Office in May for those planning experiences in August–September period and in November for those planning participation in December. May be repeated.

361 Field Service in Education (2)
Prereq: soph. Participation in community agencies, summer camps, recreation programs, Head Start, and various school-related programs. Arrangements must be made in Field Experiences Office prior to participation.

458 Student Teaching in Early Childhood (7)
Assigned responsibility for teaching under supervision of master teacher in classroom in preschool through third grade for one quarter, full-time. Concurrent registration for EDPL 458, 459, and 456 is required of all early childhood education majors for full-time student teaching experience.

459 Student Teaching in Early Childhood (6)
Continuation of EDPL 458. See 458 for description.

460 Observation and Participation in Elementary or Secondary Schools (3)
Prereq: perm. Extensive participation in school program extending over period of one quarter, designed primarily for students with some classroom teaching experience, especially students from other countries.

461 Student Teaching in Middle Childhood (7)
Prereq: perm. Assigned responsibility for teaching under supervision of master teacher in classroom in 4–9 range for 1 qtr, full-time. Concurrent registration in 461, 462, and 465 is required of all middle childhood education and intervention specialist majors. Concurrent registration in 461, 463, and 465 is required of majors in arts, music, and physical education.

462 Student Teaching in Middle Childhood (6)
Prereq: 461. Continuation of 461. See 461 for description.

463 Student Teaching in Secondary Schools (6)
Prereq: perm. Assigned responsibility for teaching under supervision of master teacher in classroom in 7–12 range for one quarter, full-time. Concurrent registration in 463–464–465 is required of all majors in secondary academic areas, home economics, and industrial arts. Majors in art, music, and physical education must register concurrently for 461, 463, and 465.

464 Student Teaching in Secondary Schools (7)
Prereq: 463. Continuation of 463. See 463 for description.

465 Student Teaching Seminar (3)
Analysis and interpretation of student teaching experience. Problem-centered discussion of major areas of concern directly related to classroom teaching. Structured discussion of unit and lesson planning, evaluation, classroom management, pupil adjustment, effects of recent legislation upon classroom teacher, position procurement, professional ethics, and professional organizations. Concurrent enrollment for 13 quarter hours credit in student teaching required.

466 Student Teaching for Advanced Students (6–9, max 9)
Prereq: perm. Supervised observation, participation, and limited teaching; open only to elementary education degree candidates and selected secondary education and special education with a minimum of three years of prior teaching experience.

Secondary Education (EDSE)

297T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm.

298T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm.

299T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm.

350 Secondary School Planning and Instruction (4)
Prereq: adv standing. Designed to enable preservice educators to design, implement, evaluate, and reflect upon the processes of secondary school teaching and learning. Course focuses on systematic planning, methods of direct instruction, and effective classroom interaction. Course is specifically designed around the four domains of Praxis III with particular focus placed upon domain A—organizing content—and domain B—creating a learning environment—with emphasis on content area reading skills applied to textbook analysis and readability. Analyses used for planning appropriate instruction. Course includes clinical and field experiences in secondary schools.

351 Secondary School Teaching and Learning (5)
Prereq: EDSE 350 and EDCI 371B. Extends upon the content of 350. Using the Ohio model curricula, the course explores secondary school curriculum development and assessment. The course helps preservice teachers to build a repertory of teaching strategies by exploring methods of induction, inquiry, and constructivism. Praxis III domains are addressed in student-developed learning units and modules, which are field tested in school classrooms prior to student teaching in the same setting. Particular emphasis is given to domain C—teaching for student learning—and domain D—professionalism—with emphasis given to uses of content area reading skills for improving instruction. Skills supplement specific methodologies taught in the course. Course includes a 2 credit hour lab scheduled with EDCI 371B.

397T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm; 297T and 299T

398T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm; 297T and 299T.

399T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm; 297T and 299T.

440 Secondary School Science Methods (4)
Prereq: 351; jr; perm. Coreq: 440L. Study of curriculum and teaching goals; preparation of inquiry-based lessons; uses of technology in science instruction; science safety, studied and practiced. Written and verbal evaluation of teaching; critiques of instructional resources; creation of a science teacher professional development plan.

440L Secondary School Science Teaching Lab (2)
Prereq: 351; jr; perm. Coreq: 440. This practicum experience in approved school settings enables University students to teach school science students, building from small group instruction to extended teaching of entire classes. College students also participate in science fairs, contests, and olympiads.

479 Teaching of the Social Studies in Junior and Senior High Schools (4)
Prereq: 351. Nature, development, purpose, and value of social studies, with emphasis on methods and techniques of instruction. Curriculum reorganization, unit planning, materials of instruction, and evaluation.

490 Studies in Secondary Education (1–5, max 15)
Prereq: perm of dept chair. Honors students or students seeking honors in secondary education may register for this course.

497T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm; 397T.

498T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm; 398T.

499T Secondary Education Tutorial (1–15)
Prereq: Honors Tutorial College and perm; 397T and 399T.

Special Education (EDSP)

260 Field Experience in Special Education (Block II) (4)
Prereq: Block I and adv standing. Serve 80 hours as a special education teacher's assistant; follow the teacher's directions and instructional plans for working with pupils until given the responsibility to develop your own plans which may be appropriate near the end of the quarter.

271 Introduction to Education of Exceptional Children and Youth (4)
Comprehensive survey of special education programs emphasizing multidisciplinary approach, integration, and current trends in providing instruction to persons with exceptionalities, and legal rights under the Individuals with Disabilities Education Act are covered. Clinical and/or field experience is included. Middle level, secondary, and special education majors should not register for this course, but should enroll in the Sophomore Block (EDCI 200, 201 and 202).This class is required for early childhood education majors. No credit for both 271 and EDCI 201.

272 Introduction to Education of Mentally Retarded Children and Youth (3)
Etiology, diagnosis, classification, learning potential, and general characteristics of children with mental retardation with an emphasis on psychosociological impact of retardation upon individual, family, and community.

355 Technological Applications in Special Education (4)
Prereq: Block I. Develop knowledge and experience necessary to use microcomputers and other technology with persons who have special needs. Consideration is given to the functionality of hardware, software, and peripherals available for use with these individuals. A focus will be on the concerns of special education teachers in using Computer Aided Instruction and other technology with students including: compensation for sensory, physical, communication, and learning handicaps.

360 Field Experience in Special Education/ Mild to Moderate Educational Needs (4)
Prereq: Block II. Provides a minimum of 80 direct field hours of practical application of concepts and skills introduced in special education in the prerequisite and current block courses; direct observations, planning, and teaching persons with mild to moderate educational needs under the supervision of a cooperating teacher and University supervisor.

361 Field Experience in Special Education/ Moderate to Intensive Educational Needs (4)
Prereq: Block II and adv standing. Provides a minimum of 80 direct field hours of practical application of concepts and skills introduced in special education in the prerequisite and current block courses; direct observations, planning, and teaching persons with moderate to intensive educational needs under the supervision of a cooperating teacher and University supervisor.

370 Classroom Management of Learners with Special Needs (4)
Prereq: Block II. Emphasizes applied behavioral techniques to reduce behavioral problems, maximize learning, and increase pupil and teacher rapport for students with mild to moderate educational needs. Procedures will move systematically from teacher control to shared control with learner to learner self-control techniques. Course content and activities also focus on the study of student needs and behaviors with identification of selected management methods. Management techniques are explained, demonstrated, practiced in class, applied in school, and reported in a class seminar and in writing. The course continues to develop teacher skills applicable in field teaching, student teaching, and professional teaching.

371 Teaching the Preschool Handicapped (3)
Prereq: Block II or perm. Purpose, organization, and methods utilized for preschool children with special needs. Variety of program models and delivery systems covered.

373 Curriculum Planning for Learners with Special Needs (4)
Prereq: Block I and adv standing. Development of a curriculum rationale; a philosophy; a model; skills in curriculum analysis; selection, development, and adaptation of curricula, instructional plans, and materials fitting to the goals of the school and the needs of exceptional learners in special and regular classrooms. Skills are developed in planning a school curriculum, a classroom curriculum, a unit of study, lesson plans, and selection of instructional materials.

374 Nature and Needs of Learners with Mild to Moderate Educational Needs(5)
Prereq: Block I and adv standing. A comprehensive review of the nature and needs of learners with mild to moderate educational needs. A cross-categorical orientation is followed, with an emphasis on the characteristics of the traditional high incidence disability areas of specific learning disabilities, emotional/behavior disorders, and mild mental retardation. Topics include etiology; definitions; culturally sensitive identification and assessment procedures; educational services; cognitive, academic, and social-emotional characteristics; life span ramifications; and current issues in the field.

376 Methods for Learners with Mild to Moderate Educational Needs (5)
Prereq: Block III and adv standing. Organization and methods of teaching including selection, planning, and teaching of appropriate unit based, project based, problem based, community based, cooperative, inquiry and constructive learning with emphasis on implementation of current theory and research to strengthen personal-social-vocational adjustment of children with mild-moderate disabilities. Specific techniques will be presented and practiced on how to develop, remediate, or compensate for student learning disabilities, learning styles, learning modalities, working styles, study skills, and intelligences.

377 Career Development and Transition Planning for Learners with Special Needs (4)
Prereq: Block II and adv standing.
A comprehensive overview of the continuum of vocational options at the secondary and postsecondary levels. Procedures for preparing children and adults with exceptionalities to fulfill their career roles as family members, community residents, as well as workers also will be examined.

378 Principles of Work for Persons with Disabilities (3)
Prereq: 271 or 272, or EDCI 201, or perm. Development of skills for understanding and application of agency mission, work values, plant layout, production flow, work site analysis, ergonomics, adaptive fixturing, time study, scheduling, work motivation, quality control, safety, evaluation, and records to enhance sheltered or community employment programs for persons with disabilities.

379 Principles of Habilitation Programming for Persons with Disabilities (3)
Prereq: 271 or 272 or perm. Development of skills used in selecting what to teach and planning to teach by using objectives, organization, methods, materials, and programs essential to teaching self-care, homemaking, family, and community skills to adults with disabilities.

401 Interventions for Students with Emotional and Behavioral Needs (4)
Prereq: Block III. Development and teaching of intervention strategies for students with mild to intensive educational needs who experience emotional and behavioral difficulties. Specific methods in the areas of behavioral interventions, positive behavioral supports, social skills training, psychoeducational techniques, assessment, collaboration, crisis intervention and communication skills. Related skills in functional behavior assessment and developing behavior intervention plans are covered.

460 Field Experience in Special Education—Mild to Moderate Educational Needs (4)
Prereq: Block III and adv standing. Field-based experience designed to provide supervised practical experience through tutoring children or youth with mild to moderate educational support needs in the public school setting. Field experience includes diagnostic-prescriptive teaching in areas of reading, arithmetic, and language arts.

461 Field Experience in Special Education—Moderate to Intensive Educational Needs (4)
Prereq: Block III and adv standing. Practical application of concepts and skills introduced in the special education Block IV courses: supervising, managing, and teaching persons with moderate to intensive educational needs.

463 Field Experience in Special Education—Early Childhood Special Education (3)
Coreq: 371. Field-based experience designed to provide supervised practical experience in early childhood special education.

473 The Nature and Needs of Learners with Moderate to Intensive Educational Needs (5)
Prereq: Block I and adv standing. Analyses of etiologies, characteristics, and assessment of learners, with mental retardation, physical and sensory impairments, medical and behavioral disabilities. Medical, behavioral, social, communicative, assistive devices, psychosocial aspects, legal, ethical, cultural, family, self-determination, and advocacy issues are studied in relation to the characteristics and needs of learners from birth to adulthood with moderate to intensive educational needs.

475 Methods and Materials for Teaching Persons with Moderate to Intensive Educational Needs (5)
Prereq: 473, Block III, and adv standing. Design and application of multifactored/ transdisciplinary assessment procedures, curricular adoption/development, IEP transition, technology planning, proficiency testing/alternatives, instructional strategies including age appropriate, functional,
and community reference skills; use of positive behavioral supports; educational, adaptive equipment, assistive devices, and instructional materials to promote self-determination. Methods are applied through case-based instruction, hands-on participation, and cooperative teaming.

477 Consultation and Collaboration in Special Education (4)
Prereq: Block III and adv standing. Comprehensive overview and development of professional competencies related to collaboration and consultation in special education. Content includes the consultation process, communicating with professionals and parents, working in teams, legal and ethical issues, interagency and interdisciplinary collaboration, and collaborating with families of students with special needs.

485 Diagnosis and Evaluation of Children with Disabilities (4)
Prereq: Block II. Covers the traditional and non-traditional methods of assessment, screening and classification, collection and appropriate application of clinical data utilizing laboratory and field experiences.

490 Study of Special Education (1-5, max 15)
Prereq: Perm of area coordinator. Independent analysis of problems, special interests, concerns, with assigned and suggested readings, programmed experiences, and preparation of final report, with guidance of faculty member.

Electronic Media (EM)

formerly Radio-Television (RTV)
The following courses are available only at the Zanesville, Southern, and Lancaster campuses for the A.A.S. in electronic media:

101 Introduction to Electronic Media (3)
(fall) Overview of field, facilities, student responsibilities, and career expectations in electronic media.

122 Radio-Television Performance (4)
(spring) To provide overview of responsibilities required for radio and television announcing, and to provide practice and performance situations necessary to develop proficiency in performance skills.

189 Electronic Media Workshop– Non-Majors (1-3)
Short course in specific topics in electronic media applications. Emphasizes hands-on practice on such subjects as visual composition, camcorder operations, video editing, lighting, audio editing, and media digitization. Intended for non-majors.

209 Topics in Radio-Television Engineering (3, max 18)
Intensive study of all functions of electronics as they relate to topics in field. Prepares students who complete all topics to take FCC General Class and/or SBE exams required for broadcast engineering positions. Lab time included with instruction on operation of test equipment and facilities maintenance.

211 Audio Production-Direction (4)
(winter) Principles of basic radio production and development of criteria for evaluation of radio production. 2 lec, 4 lab.

214 Advanced Audio Production/ Performance (2, max 4)
Prereq: 211. (fall, spring) Innovative techniques for production and performance of audio materials. Investigation and analysis of audio production development, and individual problems.

216 Introduction to Video Production (4)
(spring) Principles of basic television production and development of criteria for evaluation of television production. 2 lec, 4 lab.

217 Advanced Video Production (2, max 4)
Prereq: 216. (winter, spring) Applications of studio and field production with emphasis on innovative techniques.

257 Advertising in the Broadcast and Cable Media (4)
(winter) Introduction to principles and practices of advertising and selling of time in electronic media situations. Format includes substantial instruction and interaction with individuals employed in station sales departments, and preparation of materials for sales strategies and campaigns.

267 International Media Systems (4)
Surveys the role of the media in representative foreign countries. Media are examined relative to their structure, function, patterns of use, regulation and control, and relationship to other systems. Culture, politics, history, economics, geography, educational levels, and other aspects of the countries will be discussed.

288 Electronic Media Workshop– Multimedia
Prereq: 219 Production of multimedia related assignments, monitored and supervised by Electronic Media faculty. Requires minimum number of assigned tasks per week during the term.

289 Broadcast Workshop (1, max 6)
Prereq: EM major. (fall, winter, spring) Production of technically related assignments monitored and supervised within broadcast related services of OU–Zanesville. Requires minimum number of assigned hours of tasks per week during school terms.

290 Radio-Television Internship (1)
Prereq: EM major. Approved assignments in area radio, TV, cable, or media production facilities. Requires contract of duties and time commitment between coordinator, student, and employee. Written evaluation required for course completion.

298 Independent Study (1–4, max 4)
Prereq: EM major, written proposal, and perm. Research projects requiring self-directed study and completion of paper or production relating to electronic media. (May be repeated up to 4 qtrs.)

Electronics Technology (ETCH)

The following courses for the A.A.S. in electronics technology are available on the Lancaster and Southern campuses:

110 Basic Electronics (4)
Prereq: MATH 101, 102, or higher placement. Introductory knowledge of electricity and solid state electronics. Basic electrical terms, units, symbols, schematics, and code. Fundamentals of alternating current and direct current electricity. Ohm's Law applied to series and parallel networks. Inductance and capacitance theory. Test equipment used for troubleshooting. Fundamentals of solid state theory and application. Operating characteristics of diodes, transistors, and I.C.s. Concludes with introduction to computers and microprocessors. 2 lec, 4 lab.

111 AC and DC Circuit Analysis (4)
Prereq: 110, MATH 113, or perm. AC and DC electrical circuits. Application of network theorems to circuits containing resistors, capacitors, inductors, and transformers emphasized. 2 lec, 4 lab.

112 Industrial Electronics (4)
Prereq: 111 or perm. Advanced study of solid state devices, their operating characteristics, and circuit analysis. Transistor amplifiers, bias, impedance matching and classes of operation, integrated circuit theory, and application. 2 lec, 4 lab.

120 Digital Electronics (4)
Prereq: 111 or perm. Comprehensive study of pulse and digital circuits used in industry. Wave shaping, switching circuits, trigger circuits, nonsinu-soidal oscillators, and sequencing s ystems. Digital concepts, Boolean algebra, logic circuits, memory circuits, arithmetic unit, and logic application to electronic control circuits. Field trips part of lab activity. 2 lec, 4 lab.

134 Direct Current Circuit Analysis (5)
Prereq: 110 or perm. Direct current electrical theory, application, and circuit analysis. 3 lec, 4 lab.

135 Alternating Current Circuit Analysis (5)
Prereq: 134 or perm. Alternating current electrical theory, application, and circuit analysis. Sinusoidal wave forms, inductive reactance, resonance circuits, and RC circuits. Power transformers and polyphase systems. Power generation and distribution. 3 lec, 4 lab.

140A–J Power Distribution Systems (1–5, max 5 each segment)
Prereq: 135 or perm. (A) residential electrical wiring, (B) commercial electrical wiring, (C) industrial electrical wiring, (D) National Electrical Code, (E) low-voltage wiring, (F) high-voltage systems, (G) fire alarm systems, (H) electrical safety, (I) electrical blueprints and specifications, (J) new developments in power distribution.

220 Electrical Motors, Control Circuits, and Computers (4)
Prereq: 111 or perm. Industrial power rotating machines and computer control. Motor principles, classification, and application. Motor control circuits, single phase, 3-phase systems, relays, and overload protection. Testing and maintenance procedures. Field trips part of lab activity. 2 lec, 4 lab.

221A Programmable Controllers, Instrumentation and Process Control I (4)
Prereq: 220 or perm. A study of process control including transducers and controller principles. Emphasis on instrumentation, programmable controllers, and analog and digital control of the manufacturing process. 2 lec, 4 lab.

221B Programmable Controllers, Instrumentation and Process Control II (4)
Prereq: 221A or perm. Continuation of 221A. Emphasis on process control. 2 lec, 4 lab.

234 Industrial Electronics and Linear Integrated Circuits (5)
Prereq: 112 or perm. Theory and application of solid state industrial control. Silicon control rectifiers, photoelectric, differential amplifiers, oscillators, and phase shift controls. 3 lec, 4 lab.

236A Microprocessor and Computer Basics (4)
Prereq: 120 or perm. Introduction to computer organization and design, including ROMs, RAMs, microprocessors, instruction sets, hardware, software, and machine and assembly language programming. 2 lec, 4 lab.

236B Microprocessor and Computer Basics (4)
Continuation of 236A. Emphasis is on computer interfacing.

236C Robotics (6)
Prereq: 236B, MATH 118; or perm. Introduction to fundamentals of robotics. 3 lec, 6 lab.

237 Design and Production of Electronic Circuits (3)
Printed circuit theory, design, application, and fabrication. 2 lec, 2 lab.

240A-P Electronic Communication Systems (3–5)
Prereq: 234 or perm. Introduction to various types of communication systems. Includes microwave, R.F., television, audio, and sound systems.

250 Computer Programming for Electronic Circuit Analysis (3)
Prereq: 112 or perm. Introduction to high-level language programming for solution of electronic circuit problems. 2 lec, 2 lab.

260 Data Communications and Computers (4)
Prereq: 236B or perm. A study of computer communications systems, including telecommunications. Topics include modems, amplifiers,
local area networks (LANS), communication standards, and protocols. An introduction to the principles of radio, television, telephone, and digital networks will also be studied. 2 lec, 4 lab.

288 Personal Computer Maintenance (4)
Prereq: 236B or perm. Repair and trouble shooting of the personal computer emphasizing the IBM series. Topics will include specifications, documentations, timing diagrams, diagnostic programs, test instruments, logic analyzers, and in-circuit emulation. Other personal computers may be considered. 2 lec, 4 lab.

289 Electronic Trouble Shooting and Repair (4)
Prereq: 112 and 120 or perm. Fundamentals of test equipment applications with emphasis on repair of consumer and industrial analog equipment. 2 lec, 4 lab.

299 Special Problems (1–3, max 9)
Prereq: perm. Individualized projects or internship experiences under supervision of faculty member in electronics technology.

Engineering, Chemical (CHE)

100 Introduction to Chemical Engineering (2)
(fall) Overview of the profession's history, present status, and future opportunities. Goals and details of the curriculum. 2 lec.

101 Approaches to Chemical Engineering Problem Solving (3)
Prereq: MATH 263A. (spring) Introduction to goals and methods of problem-solving techniques; uses of computers for calculations, document preparation. Implementation of selected professional software. 3 lec.

200 Material Balances (4)
Prereq: 101. (fall, summer) Applications of chemistry, physics, and mathematics to the solution of mass balances. Single and multiple unit systems. Reactions, recycle, and bypass. Single and multiphase systems. 3 lec, 2 rec.

201 Energy Balances (4)
Prereq: 200, C or better. (winter, summer) Continuation of 200. Energy balances. First Law of Thermodynamics. Nonreactive and reactive processes. Heats of reaction, formation, and combustion. Phase change operations. 3 lec, 2 rec.

305 Chemical Engineering Thermodynamics (4)
Prereq: 201, C or better. (fall) Application of thermodynamics to chemical engineering problems, including problems in chemical equilibrium in homogeneous and heterogeneous systems, mixtures, and pure materials. 3 lec, 2 rec.

306 Chemical Engineering Phase Equilibria (4)
Prereq: 305. (winter) Continuation of 305. See 305 for description. 3 lec, 2 rec.

307 Chemical Reaction Engineering I (3)
Prereq: 306, 400. (spring) Application of chemical kinetics and material and energy balances to the design of chemical reaction
systems. 2 lec, 2 rec.

308 Chemical Reaction Engineering II (4)
Prereq: 307, 346, 400. (fall) Continuation of 307. See 307 for description. 3 lec, 2 rec.

331 Principles of Engineering Materials (4) (2A)
Prereq: CHEM 122 or 152. (fall, winter, spring, summer) Fundamental principles underlying behavior of engineering materials. Relationship between structure and properties of ceramic, metallic, and polymeric materials. 4 lec.

345 Chemical Engineering Fluid Mechanics (5)
Prereq: 201, C or better, MATH 340. (fall) Fundamental principles of fluid flow. Transportation and metering of fluids. Laminar and turbulent flow of fluids in conduits and past immersed bodies. 4 lec, 2 rec.

346 Chemical Engineering Heat Transfer (5)
Prereq: 345, 400. (winter) Fundamental principles of heat transfer. Conduction, convection, and radiation heat transfer. Heat exchanger design. 4 lec, 2 rec.

347 Mass Transfer and Separations (5)
Prereq: 306, 346. (spring) Fundamental principles of mass transfer. Diffusivities, mass transfer coefficients, stage-wise and continuous-contact unit operations. Absorption, distillation, extraction. 4 lec, 2 rec.

400 Applied Chemical Engineering Calculations (3)
Prereq: C or better in 201, MATH 340. (fall) Application of analytical mathematics and numerical methods to the formulation and solution of chemical engineering problems. 3 lec.

408 Engineering Experimental Design (3)
Prereq: 305, 345, 400. (winter) Application of engineering analysis and statistics to the design of experiments with particular emphasis on continuous processes as typically encountered in the chemical and materials areas. 2 lec, 2 rec.

415 Unit Operations Laboratory I (3)
Prereq: 307, 347, 408. (fall) Lab practice to illustrate principles of selected unit operations, thermodynamics, and applied kinetics; and to aid student in gaining confidence in handling of chemical engineering equipment. Development of ability to devise and conduct chemical engineering experiments with minimum supervision and to report results satisfactorily will be stressed.

416 Unit Operations Laboratory II (3)
Prereq: 308, 347, 408. (winter) Continuation of 415. See 415 for description.

417 Process Control Laboratory (2)
Prereq: 442 or with 442. (spring) Laboratory for 442.

418 Engineering Materials Laboratory (2)
Prereq: 331. (fall, winter, spring) Demonstrations and experiments supporting relationships which exist between the physical treatment and the structure and properties of materials.

430 Metallic Corrosion (4)
Prereq: 331. Basic principles of corrosion including electrochemical foundation, influence of environment, stress, strain, and structure. Selected lab experiments. 4 lec.

431 Advanced Topics in Materials Science and Engineering (3)
Prereq: 331. Structure, processing, and applications of ceramics, polymers, and composites. Corrosion and degradation of materials. Electrical, thermal, optical, and magnetic properties of materials. Materials selection and design. 3 lec.

442 Process Control and Simulation (4)
Prereq: 308, 346. (winter) Simulation and control of chemical processes. Feedback control using root loci and Bode diagrams covered. 3 lec, 2 rec.

443 Chemical Engineering Design I (4)
Prereq: 308, 347, 448. (winter) Preliminary design of a chemical process. Process synthesis, computer flowsheeting, layout, safety, and economics. Involves trips to various chemical plants. Also involves the assessment of skills from explicit and implicit prerequisite courses. 2 lec, 4 rec.

444 Chemical Engineering Design II (4)
Prereq: 443. (spring) Continuation of 443. See 443 for description. 2 lec, 4 rec.

448 Safety in the Process Industry (3)
Prereq: 307, 347. (fall) Hazard and operability analysis of chemical processes and the subsequent safe operation criteria. 3 lec.

450 Fundamentals of Materials Analysis (3)
Prereq: 331 or perm. An overview of both classical and modern techniques of materials analysis. Topics covered include classical optical spectroscopies (IR, FTIR, Raman, UV/VIS), and modern surface techniques, such as AES, XPS/ESCA, and RBS. 3 lec.

452 Introduction to Transport Phenomena (3)
Prereq: 347, 400. Integration of fluid flow, heat transfer, and mass transfer into a coherent topic. Origin of general equations and methods of application to specific engineering problems. Introduction to contemporary engineering science. 3 lec.

460 Atmospheric Pollution Control (4)
Prereq: 307 or ME 321, or perm. Sources of air pollution from major industries, internal combustion engines, and other sources. Techniques available for measuring particulate and gaseous pollutants in atmosphere and at their sources. Techniques available for control and future possibilities for control of air pollution. Bases for air pollution legislation. 4 lec.