

TEACHER EDUCATION

Department of Teacher Education College of Education

- 120 Seminar in Integrated Science for Elementary Schools**
Spring. 1(1-1) Interdepartmental with Science and Mathematics Education. Administered by College of Natural Science. P: (BS 110 or BS 111 or CEM 141 or PHY 231 or PSL 250 or MMG 205 or GLG 201 or GEO 203) R: Open only to students in the Integrated Science Teaching major, the Special Education major, the Child Development major, the Elementary Teacher Education program, the 5th-year teacher certification program, or approval of college.
Exploration of major connecting themes in life sciences, earth science, and physical science as evidenced in the K-8 science curriculum and college science courses.
- 150 Reflections on Learning**
Fall, Spring, Summer. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education.
Students' experiences as learners in comparison to psychological, sociological, and anthropological theories and assumptions about learning and teaching in and out of school.
- 240 Diverse Learners in Multicultural Perspective**
Fall, Spring, Summer. 3(2-2) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education. Not open to students with credit in TE 250.
Communicative, linguistic, physical, sensory, behavioral, affective, and cognitive differences in learning in multicultural classrooms. Factors that mediate access to knowledge.
- 250 Human Diversity, Power, and Opportunity in Social Institutions**
Fall, Spring, Summer. 3(3-0)
Comparative study of schools and other social institutions. Social construction and maintenance of diversity and inequality. Political, social and economic consequences for individuals and groups.
- 301 Learners and Learning in Context (W)**
Spring. 4(3-4) P: Completion of Tier I writing requirement. RB: (TE 150) And (TE 250 Or CEP 240) R: Not open to freshmen or sophomores. Open only to students admitted to the teacher certification program.
Role of social context and sociocultural background in learning. Natural and socially constructed differences among learners. Relationship among subject-specific knowledge, teaching and learning that subject, and the institutional and communal context. Multiple literacies.

- 614 Neurosurgery Clerkship**
Fall, Spring, Summer. 6 credits. A student may earn a maximum of 18 credits in all enrollments for this course. RB: SUR 608. R: Open only to graduate-professional students in College of Human Medicine.
Problems related to common emergent and elective neurosurgery involving the brain, spine, and peripheral nerves. Neurological examinations, diagnostic methods.
- 615 Ophthalmology Clerkship**
Fall, Spring, Summer. 6 credits. A student may earn a maximum of 18 credits in all enrollments for this course. RB: (SUR 608) R: Open only to graduate-professional students in College of Human Medicine.
Medical and surgical treatment of eye diseases. Clinical experiences include private office practice, surgical observations, pre-and post-operative care.
- 616 Thoracic Surgery Clerkship**
Fall, Spring, Summer. 6 credits. A student may earn a maximum of 18 credits in all enrollments for this course. RB: (SUR 608) R: Open only to graduate-professional students in College of Human Medicine.
Problem solving in thoracic medicine and surgery. Pulmonary physiology. Diagnostic tools and tests, and indications for surgical procedures.
- 618 Anesthesia Clerkship**
Fall, Spring, Summer. 6 credits. A student may earn a maximum of 18 credits in all enrollments for this course. RB: (SUR 608) R: Open only to graduate-professional students in College of Human Medicine.
Common anesthetic agents. Performing anesthetic procedures under faculty supervision.
- 619 Sub-specialty Surgery Clerkship**
Fall, Spring, Summer. 6 credits. A student may earn a maximum of 18 credits in all enrollments for this course. RB: (SUR 608) R: Open only to graduate-professional students in College of Human Medicine.
Surgical domains not covered otherwise or in which students desire further exposure.
- 620 Senior Surgery Clerkship**
Fall, Spring, Summer. 6 to 12 credits. A student may earn a maximum of 12 credits in all enrollments for this course. RB: (SUR 608 and MED 608) R: Open only to graduate-professional students in the College of Human Medicine.
Understanding of the principles of various surgical specialties, critically ill patients, or enhanced exposure to ambulatory general surgery.
- 633 Extended Clinical Experience**
Fall, Spring, Summer. 6(6-0) Fall: All six(6) campuses. Spring: All six(6) campuses. Summer: All six(6) campuses. P:M: (SUR 608)
Based in community hospitals and ambulatory sites, this is a 4 week clinical experience emphasizing interviewing skills, history, physical exam, problem solving and therapy.
- 637 Core Competencies III**
Fall, Spring, Summer. 2(2-0) Fall: same as below. Spring: Flint-Saginaw-GR-Lansing-Kalamazoo-UP. Summer: Flint-Saginaw-GR-Lansing-Kalamazoo-UP. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Human Medicine; Family Practice; Medicine; Obstetrics, Gynecology and Reproductive Biology; Pediatrics and Human Development. Administered by College of Human Medicine. R: Open only to graduate-professional students in College of Human Medicine.
Core knowledge and skills from an interdisciplinary perspective.
- 801 Shock and Metabolism**
Fall. 4(4-0) R: Open only to M.S. students in Surgery.
Results of prolonged reduction in tissue perfusion on tissue metabolism, structure, and function at the systemic, cellular and subcellular levels. Pharmacologic interventions useful in volume resuscitation.
- 803 Enteral and Parenteral Nutrition**
Fall, Summer. 3(3-0) R: Open only to M.S. students in Surgery.
Identification of individuals requiring nutritional support. Nutritional requirements in diseases. Delivery of total parenteral and enteral nutrition. Special problems.
- 804 Research Design and Quantitative Techniques for Surgical Residents**
Spring. 3(3-0) R: Open only to students in master's degree program in Surgery.
Recognition and differentiation between experimental designs. Identification of strengths and weaknesses of a manuscript. Recognition and definition of statistical terms and common inferential techniques used in surgical research. Use of computer software in research.
- 890 Seminars in Research**
Fall, Spring, Summer. 1 credit. A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to M.S. students in Surgery.
Philosophy and methods of research. Preparation and presentation of research data in research reports. Practical applications.
- 899 Master's Thesis Research**
Fall, Spring, Summer. 3 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course. RB: (SUR 801 and SUR 802 and SUR 803 and SUR 804) R: Open only to M.S. students in Surgery. Approval of department.
Master's thesis research.

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- 311 Growing Up and Coming of Age in Three Societies (D)**
Fall of odd years. 3(3-0) RB: One IAH course, one ISS course, completion of Tier I writing requirement. R: Not open to freshmen and sophomores. SA: TCC 305
Diverse disciplinary and cultural perspectives of childhood and youth. Continuity and change in families and schools. Factors such as ethnicity, race, gender, and political philosophies. Focus on three contrasting societies.
- 320 Integrated Science for Elementary Schools**
Spring. 3(2-2) Interdepartmental with Science and Mathematics Education. Administered by College of Natural Science. P: (SME 120) and (BS 110 or LBS 144 or LBS 148 H or BS 111 or LBS 145 or LBS 149 H or PSL 250 or ZOL 355) and (PHY 231 or LBS 231 or CEM 141 or LBS 171) and (GLG 201 or GEO 203 or AST 207) R: Open only to students in the Integrated Science teaching major. Not open to students with credit in SME 301.
Analysis of the concepts integrating science across life sciences, earth sciences, and physical sciences. Applications to the K-8 science curriculum.
- 348 Reading and Responding to Children's Literature**
Fall, Spring, Summer. 3(3-0)
Literary understanding and genres in reading and teaching children's literature. Critical and theoretical perspectives in evaluating children's literature. Children's responses to literature. Literary, social, and pedagogical issues in the study of children's literature.
- 401 Teaching of Subject Matter to Diverse Learners**
Fall. 5(3-8) P: (MTH 201 and TE 301 and TE 348) and completion of Tier I writing requirement. RB: (MTH 202) R: Not open to freshmen or sophomores. Open only to students admitted to the teacher certification program.
Examining teaching as enabling diverse learners to inquire into and construct subject-specific meanings. Adapting subject matter to learner diversity. Exploring multiple ways diverse learners make sense of the curriculum.
- 402 Crafting Teaching Practice (W)**
Spring. 6(4-8) P: Completion of Tier I writing requirement. RB: (TE 401) R: Not open to freshmen or sophomores. Open only to students admitted to the teacher certification program.
Gathering data on learners to inform content and instructional decisions. Deciding what should be taught for specific disciplines. Teachers' multiple roles and their professional, intellectual, sociopolitical, and communal responsibilities.
- 420 Integrated Science Research for Elementary Schools**
Fall. 3(2-2) Interdepartmental with Science and Mathematics Education. Administered by College of Natural Science. P: (SME 320) and (STT 200 or STT 201) R: Open only to students in the Integrated Science teaching major.
Research design and data analysis of individual research projects relevant to the K-8 science curriculum, integrating topics in life, earth, and physical science.
- 490 Independent Study in Teacher Education**
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Not open to freshmen or sophomores. Open only to students admitted to the teacher certification program. Approval of department.
Supervised individual or small group study of the practice of teaching.
- 491 Special Topics in Teacher Education**
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Not open to freshmen or sophomores. Open only to teacher certification candidates.
Aspects of teaching practice and inquiry into practice.
- 494 Field Experience in Teacher Education**
Fall, Spring. 1 to 10 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Approval of department.
Supervised practica and/or observations in educational settings.
- 495 Student Teaching in Music**
Fall, Spring. 9 credits. Interdepartmental with Music. Administered by School of Music. R: Open only to seniors in the Bachelor of Music Education major.
Supervised music teaching experience in schools. On-campus seminar required.
- 501 Internship in Teaching Diverse Learners I**
Fall. 6(2-24) P:M: (TE402) R: Open only to students seeking teacher certification.
Directed and evaluated internship in heterogeneous classrooms. Teaching worthwhile content to students with varied learning needs. Theoretical and field-based explorations of common teaching dilemmas.
- 502 Internship in Teaching Diverse Learners II**
Spring. 6(2-24) P:M: (TE 501) R: Open only to students admitted to the Teacher Certification Internship-Year Studies Program. Not open to students with credit in CEP 502A or CEP 502B or CEP 502C or CEP 502D.
Continuing internship in heterogeneous classrooms at selected schools. Increased emphasis on independent teaching. Maintaining classroom communities that ensure equitable access to important knowledge and skills. Assessing academic and social outcomes.
- 801 Professional Roles and Teaching Practice I**
Fall. 3(2-3) P:M: (TE402) R: Open only to students admitted to the Teacher Certification Internship-Year Studies Program. Not open to students with credit in CEP 801A.
Teachers' professional and ethical responsibilities. Connections of schools to other social agencies. Relations of teachers to colleagues, families, other social service providers, and community leaders. Roles in school governance.
- 802 Reflection and Inquiry in Teaching Practice I**
Fall. 3(2-3) P:M: (TE 402) R: Open only to students admitted to the Teacher Certification Internship-Year Studies Program. Not open to students with credit in CEP 802A or CEP 802C or CEP 802D.
Qualitative and quantitative research methods on teaching and learning. Criteria for judging the validity and applicability of research-based knowledge. Framing educational problems worthy of inquiry. Designing and assessing studies of teaching practice.
- 803 Professional Roles and Teaching Practice II**
Spring. 3(2-3) P:M: (TE 801) R: Open only to students admitted to the Teacher Certification Internship-Year Studies Program. Not open to students with credit in CEP 803A or CEP 803C or CEP 803D.
School-agency alliances for fostering student learning. Strategies for working with families and community groups to improve responsiveness of the school curriculum to student needs. Child advocacy in the school and community.
- 804 Reflection and Inquiry in Teaching Practice II**
Spring. 3(2-3) P:M: (TE 802) R: Open only to students admitted to the Teacher Certification Internship-Year Studies Program. Not open to students with credit in CEP 804A or CEP 804C or CEP 804D.
Collecting, analyzing, and interpreting data on teaching, learning, and educational policy. Dilemmas surrounding research on practice. Appraising and reporting results of inquiry.
- 805 Learning Mathematics with Technology**
Fall. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education.
Current technologies for teaching and learning mathematics with understanding. Technology for multiple representations of mathematical ideas, modeling, and authentic learning environments. Psychological and mathematical perspectives on learning mathematics.
- 806 Learning Science with Technology**
Spring. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education.
Possibilities, ideas, and issues associated with teaching science with technology. How K-12 teachers use Internet resources (e.g. simulations, databases, communities) to facilitate science learning. Contemporary conceptual perspectives from educational psychology on important issues of learning.
- 807 Professional Development and Inquiry**
Fall, Summer. 3(3-0) R: Open only to masters students in Curriculum and Teaching.
Teacher-centered inquiry through autobiography and documentation of self as learner. Relationship of personal research to classroom-based research. Application to practice.

- 808 Inquiry into Classroom Teaching and Learning**
Fall, Spring, Summer. 3(3-0) P:M: (TE 807)
R: Open only to masters students in Curriculum and Teaching.
Alternative forms of classroom inquiry to improve teaching and learning of subject matter. Social context of teaching and learning, pedagogy, and teaching effects. Social and academic outcomes for diverse learners.
- 810 History of American Education**
Spring of odd years. 3(3-0)
Social and intellectual history of educational ideals and institutions. Legacies of reform initiatives. Evolution of the education profession.
- 811 Philosophical Inquiry and Contemporary Issues in Education**
Fall, Spring. 3(3-0)
Philosophies of education. Analytic tools used for evaluating current educational goals, practices, issues, and reforms.
- 812 Sociological Inquiry into Education**
Spring of even years. 3(3-0)
Relationships of educational organizations and practices to social structures and institutions.
- 813 Education, Development and Social Change**
Spring of odd years. 3(3-0) Interdepartmental with Educational Administration. Administered by Department of Educational Administration.
Rise of modern systems of education in developed and developing countries. Education, the state, and national development. Colonial heritage, linkages, and globalization of educational development.
- 815 Comparative Analysis of Educational Practice**
Fall of even years. 3(3-0)
Cross-national comparison of educational practices in light of differences in culture, social organization, economic conditions, and historical circumstance. International perspectives on education in the United States. Borrowing and adapting educational practices.
- 816 Education in Transition**
Fall of odd years. 3(3-0)
Comparative analysis of change in educational concepts, policies, and practice.
- 818 Curriculum In Its Social Context**
Fall, Spring. 3(3-0)
Philosophical, social, and historical foundations of curriculum. Issues and practices across subjects, grades, and school settings. Moral consequences of curriculum decisions for teachers and students.
- 820 Power and Pluralism in School Practice**
Spring of odd years. 3(3-0)
Connections between schools and diversity, inequality, and power in society. Genesis and consequences of school policies for diverse learners.
- 821 Race and Educational Policy in the United States**
Spring of even years. 3(3-0)
Educational policy in relation to race in the United States. Efforts to promote equity through racially sensitive curricular and instructional practices.
- 822 Issues of Culture in Classroom and Curriculum**
Fall of odd years. 3(3-0)
Socio-cultural contexts and functions of schooling. Cultural diversity in education. Schools and classrooms as cultural systems. Students' cultural backgrounds in relation to curriculum. Developing effective multicultural curricula for all students.
- 823 Learning Communities and Equity**
Spring. 3(3-0)
Cooperative grouping and heterogeneous learning teams. Impact of learning communities on equity and on school curricula.
- 825 Diverse Learners and Learning Subject Matter**
Summer. 3(3-0)
Multiple perspectives on teaching subject matter to diverse learners. Texts, curricula, and pedagogical approaches. Subject-specific issues related to classroom diversity.
- 826 Evaluation of Educational Programs and Policies**
Spring. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education. RB: (CEP 822)
Qualitative and quantitative methods to assess the effectiveness of public policies and resulting educational programs. Theory and practice of program evaluation.
- 830 Designing Interdisciplinary Curricula**
Spring of even years. 3(3-0)
Historical and conceptual analyses of ways to design, organize, and integrate curricula across subject areas. Evaluation and application of criteria for planning and teaching interdisciplinary curricula.
- 831 Teaching School Subject Matter with Technology**
Fall, Spring. 3(3-0)
Uses of technologies in teaching subject matter to diverse learners. Critical perspectives on technologies in schools.
- 834 Reading Comprehension Instruction**
Fall. 3(3-0) SA: TE 883C
Effectiveness of various approaches to reading comprehension instruction. Influences of different classroom contexts on reading comprehension instruction.
- 835 Theory and Research on the Teaching of Writing**
Spring. 3(3-0) SA: TE 883D
Social, cognitive, and developmental perspectives on teaching writing. Implications for curriculum and instruction in middle and secondary schools.
- 836 Awards and Classics of Children's Literature**
Spring of even years. 3(3-0) RB: (TE 849) SA: TE 883B
Critical examination of literary classics and award books for children, including children's responses to this literature.
- 837 Issues and Trends in English Education**
Fall. 3(3-0) R: Open only to master's students in Literacy Instruction and master's students in Critical Studies in the Teaching of English.
Major trends in the development of English as a school subject. Evolution of standards for English instruction and conceptions of accomplished teaching of English. Preparation of preliminary portfolio to guide students' program plan decisions.
- 840 Proseminar I: Historical Bases of Literacy Instruction**
Fall. 3(3-0) R: Open only to graduate students in Literacy Instruction.
Relationships between language processes and schooling.
- 841 Proseminar II: Psychological Bases of Literacy Instruction**
Spring. 3(3-0) RB: (TE 840) R: Open only to graduate students in Literacy Instruction.
Psychological foundations of literacy instruction, including theories and models of reading and writing. Psychological processes, social and contextual factors, and text features relevant to literacy instruction.
- 842 Advanced Methods of Elementary School Reading**
Fall, Summer. 3(3-0)
Methods and materials for teaching developmental and content area reading in grades K-8.
- 843 Reading, Writing, and Reasoning in Secondary School Subjects**
Spring. 3(3-0)
Knowledge and methodology for teaching language, literacy, and thinking in selected secondary school subjects.
- 844 Classroom Literacy Assessment**
Summer. 3(3-0)
Knowledge and methodology about ongoing and summative types of classroom assessment in oral language, reading, and writing at the elementary and secondary levels.
- 845 Language Diversity and Literacy Instruction**
Fall. 3(3-0) RB: One introductory linguistics course.
Acquisition of literacy in schools by language minority students and other learners with diverse backgrounds.
- 847 Methods for Teaching Language Arts**
Fall. 3(3-0)
Methods and materials for teaching listening, speaking, reading, and writing with emphasis on language development across the curriculum.
- 848 Methods of Writing Instruction**
Spring of even years. 3(3-0) RB: (TE 847)
Rationale and methods for writing instruction from pre-writing through drafting and editing.
- 849 Methods and Materials for Teaching Children's and Adolescent Literature**
Fall of odd years. Summer of even years. 3(3-0)
Evaluation and utilization of various genres and elements of literature with focus on literature for students in grades K-12.
- 850 Critical Reading for Children and Adolescents**
Fall of even years. 3(3-0) P:M: (TE 849)
Teaching and learning of critical and aesthetic responses to literature for K-12 students.

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- 851 Literacy for the Young Child in Home and School**
Spring of odd years. 3(3-0) RB: (TE 849)
Literacy development in children from early infancy through age six, with emphasis on evaluation and utilization of writings for young children.
- 852 Culture, Literacy, and Autobiography**
Fall of odd years. 3(3-0)
Cultural foundations of literacy through autobiography. Individual and cultural identities, ethnicity, literacy, and education in literature and autobiographical sources.
- 853 Corrective and Remedial Literacy Instruction in the Classroom**
Fall. 3(3-0)
Causes and correlates of individual differences in literacy abilities, especially among disabled readers and writers. Individualized reading diagnosis and corrective treatment plans and procedures for K-12 students and/or adult/alternative classes.
- 854 Clinical Literacy Instruction**
Spring of even years. 3(3-0) RB: (TE 843)
Clinical applications of corrective and remedial assessment and instruction for individuals with severe complex literacy problems. Assessment and treatment for students and/or adults with severe and complex reading/literacy and reading/literacy related difficulties.
- 855 Teaching School Mathematics**
Fall. 3(3-0) RB: Two undergraduate mathematics courses.
Methods, materials, activities, and content important to teaching mathematics. Emphasis on conceptual understanding of mathematical ideas. Implications for lesson development, teaching diverse learners, and evaluating student learning.
- 856 Alternatives in School Mathematics Curriculum**
Spring, Summer. 3(3-0) RB: Two undergraduate mathematics courses.
Selection and appraisal of mathematics curricula. Uses of materials in the classroom. Representation of selected mathematical content for diverse learners.
- 857 Teaching and Learning Mathematical Problem Solving**
Spring. 3(3-0) RB: Two undergraduate mathematics courses.
Alternative approaches to solving mathematical problems and incorporating problem solving into K-12 teaching. Selection, appraisal, and uses of problems in the classroom. Materials and assessment strategies.
- 860 Practice and Inquiry in Science Education**
Spring. 3(3-0)
Teaching science subjects. Emphasis on learner diversity, learning community, conceptual understanding, subject matter content, and learners' prior knowledge.
- 861A Teaching Science for Understanding**
Spring. 3(3-0) RB: A teaching certificate with concentration in science teaching at elementary or secondary level. Enrollees should be teaching or otherwise have access to a classroom for the practical components of this course.
Responses to contemporary over-emphasis on memorization and coverage of content knowledge in science teaching. Theoretical knowledge, techniques, and practical skills necessary to teach science for understanding.
- 861B Inquiry, Nature of Science, and Science Teaching**
Fall. 3(3-0) RB: A teaching certificate with concentration in science teaching at elementary or secondary level. Enrollees should be teaching or otherwise have access to a classroom for the practical components of this course.
Inquiry and the nature of science as part of current science education reforms. Theoretical knowledge and practical skills for including inquiry and the nature of science in science instruction.
- 861C Action Research in K-12 Science and Mathematics Classrooms**
Summer. 3(3-0) P:M: (TE 861A or concurrently or TE 861B) RB: A teaching certificate with concentration in science teaching at elementary or secondary level. Enrollees should be teaching or otherwise have access to a classroom for the practical components of this course.
Philosophy and methods supporting action research in sciences and mathematics classrooms. Design and implementation of an action research project in student's own setting. Analyzing, interpreting, and reporting project results. Reflection on study's value.
- 865 Teaching and Learning K-12 Social Studies**
Fall. 3(3-0)
Purposes for teaching and learning social studies. Developing citizenship, social science reasoning, and content knowledge with diverse learners.
- 866 K-12 Social Studies Curriculum**
Spring of odd years. 3(3-0)
Issues and practices in social studies from historical, philosophical, and epistemological perspectives. Student diversity and the social studies curriculum. Reforms and needed research in social studies education.
- 867 Perspectives in Social Studies: Global Education**
Summer. 3(3-0)
Issues affecting the global community. Educational strategies for developing a global perspective on human relationships and the environment.
- 868 Perspectives in Social Studies: Law-Related Education**
Summer. 3(3-0)
Intellectual, social, and personal premises for law-related education. Strategies for curricular infusion.
- 870 Curriculum Design, Development, and Deliberation in Schools**
Fall, Spring, Summer. 3(3-0) P:M: (TE 807 and TE 808 and TE 818) R: Open only to master's degree students in Curriculum and Teaching.
Simulation in group curriculum deliberation. Critique of curriculum discourse, process, and product. Teachers' roles in site-based curriculum and staff development.
- 872 Teachers as Teacher Educators**
Spring. 3(3-0)
Experienced teachers' contributions to the professional development of novice teachers. Implications for school change.
- 873 Literacy Leadership**
Spring. 3(3-0) RB: Nine credits in reading or language arts and classroom teaching experience.
Leadership roles for teachers in developing and improving literacy programs at preschool, K-12, college, and adult education levels. Assessing local needs in the context of national and state professional standards for literacy instruction. Maximizing use of resources. Evaluating programs and communicating evaluation results.
- 882 Seminars in Curriculum and Teaching**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Intensive study of selected topics in curriculum and teaching.
- 883 Seminars in Literacy Instruction**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Intensive study of selected topics in literacy instruction.
- 890 Independent Study**
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Supervised individual study in an area of curriculum, teaching, or schooling.
- 891 Special Topics in Teaching, Curriculum, and Schooling**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 15 credits in all enrollments for this course.
Current special topics in various fields of teacher education.
- 891A Special Topics in Science Education**
Summer. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
- 894 Laboratory and Field Experiences in Curriculum, Teaching, and Schooling**
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Supervised graduate practica and internships in curriculum, teaching, and schooling.
- 895 Research Ethics**
Summer. 1(1-0) Interdepartmental with Kinesiology; Counseling, Educational Psychology and Special Education; Educational Administration. Administered by Department of Kinesiology. R: Open only to graduate students in the Department of Counseling, Educational Psychology and Special Education or Department of Educational Administration or Department of Kinesiology or Department of Teacher Education. SA: PES 895
Identifying and resolving ethical problems in research, including issues related to collegial interactions; authorship, publication, and reviewing practices; data management; ownership of data and intellectual property; conflicts of interest; protection of human and animal subjects; and lab safety and compliance.

- 899 Master's Thesis Research**
Fall, Spring, Summer. 2 to 12 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
Master's thesis research.
- 901 Proseminar in Curriculum, Teaching and Educational Policy I**
Fall. 3(3-0) R: Open only to doctoral students in Curriculum, Teaching, and Educational Policy.
Two historical episodes related to improving teaching practice, teacher and student learning, curricula, and educational policy. Nature and effects of educational reforms.
- 902 Proseminar in Curriculum, Teaching, and Educational Policy II**
Spring. 3(3-0) RB: (TE 901) R: Open only to doctoral students in Curriculum, Teaching, and Educational Policy.
Two historical episodes related to improving teaching practice, teacher and student learning, curricula, and educational policy. Nature and effects of educational reforms.
- 907 Psychological Study of Teaching**
Fall of odd years. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education. R: Open only to Ph.D. students in Education.
Research literature on psychological aspects of teachers and teaching. Topics include teacher's decision-making, learning from experience and developmental changes.
- 912 Psychological and Cognitive Aspects of Literacy Learning**
Spring. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education. R: Open only to doctoral students in the College of Education.
Theory and research on psychological and cognitive aspects of literacy learning and use in sociocultural contexts.
- 913 Psychology and Pedagogy of Mathematics**
Fall of odd years. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education. RB: (CEP 902) R: Open only to Ph.D. students in College of Education.
Psychological theory and research on the learning of mathematics. Development of mathematical thinking and knowledge in school and other settings.
- 914 Learning Science with Technology: Theoretical Perspectives**
Spring of odd years. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education.
Learning and teaching of science with the Internet and other technology-mediated environments and tools. Theories and research on the learning of science. Analysis of on-line and face-to-face science learning environments.
- 915 Literacy, Learning and Development in Sociocultural Context**
Fall. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. Administered by Department of Counseling, Educational Psychology, and Special Education. R: Open only to doctoral students in the College of Education.
Role of language and literacy in mediating cognition, affect, and action in educational contexts. Relationship between oral and written discourse and sociocultural contexts.
- 917 Contemporary Theories and Discourses in Education**
Fall of even years. 3(3-0)
Logical positivism, interpretive theories, critical theory, feminist theory, poststructuralism and neo-pragmatism. Applications to curriculum, teaching, and educational policy.
- 918 Disciplinary Knowledge and School Subjects**
Spring. 3(3-0)
Cross-disciplinary comparisons of the nature of knowledge, its creation, refutation, and use. Correspondence between disciplinary knowledge and knowledge as represented in schools.
- 919 Policy Analysis in Education**
Fall. 3(3-0)
Conception, generation, and analysis of educational policies. Contexts such as governance levels, national setting, and legislative forms. Uses, limitations, and ethics of policy analysis.
- 920 Social Analysis of Educational Policy**
Spring. 3(3-0)
Social science perspectives on factors outside and inside school systems which shape policy and influence both the nature of policy problems and the form of educational solutions.
- 921 Learning to Teach**
Fall. 3(3-0)
Intellectual, practical, and moral dimensions of teaching and learning to teach. Impact of formal and informal influences on teachers' knowledge, skills, and attitudes.
- 922 Contexts and Micropolitics of Teacher Education**
Fall of odd years. 3(3-0)
Historical and contemporary forms of teacher education in relation to social and institutional contexts. Relation of traditional and innovative programs to basic tensions and issues in the field.
- 923 Comparative Perspectives on Teaching, Curriculum, and Teacher Education**
Spring of odd years. 3(3-0)
Contrasting national responses to universal questions. Links among education and other nation-building institutions. Organization and distribution of knowledge. Organization of, preparation for, and practice of teaching.
- 924 Philosophy of Education: Ideas and Methods**
Spring of even years. 3(3-0)
Selected ideas in education from different philosophical traditions. Issues of method, historical perspectives, and textual analysis.
- 928 Proseminar in Educational Policy**
Fall. 3(3-0) Interdepartmental with Educational Administration. Administered by Department of Educational Administration.
Disciplinary perspectives on policy issues. Influence of research on policy process. Politics and educational practice as determinants of policy choice.
- 931 Qualitative Methods in Educational Research**
Fall, Spring, Summer. 4(4-0) Interdepartmental with Counseling, Educational Psychology and Special Education; Educational Administration. RB: (CEP 930)
Multiple traditions of qualitative research in education. Theory, research questions and design, data collection and analysis, and reporting. Ethical issues. Appraising qualitative research.
- 940 Curriculum Deliberation and Development**
Fall of odd years. 3(3-0)
Research in curriculum deliberation and development. Discourse, group dynamics, processes, and outcomes for teaching and learning.
- 942 Economic Analysis in Educational Policy Making**
Spring of even years. 3(3-0) Interdepartmental with Educational Administration. Administered by Department of Educational Administration.
Economic effects of education. Economic analysis of policy issues in education. Alternative theoretical perspectives. Applications to the United States and other countries.
- 943 Seminar in Professional Development**
Spring of even years. 3(3-0)
Synthesis and application of knowledge acquired through consideration of research and field-based inquiry from teacher practice and change initiatives.
- 946 Current Issues in Literacy Research and Instruction**
Spring. 3(3-0)
Current research trends in the psychological, social, and political dimensions of literacy and literacy instruction.
- 950 Mathematical Ways of Knowing**
Fall of even years. 3(3-0) RB: Two undergraduate mathematics courses.
Philosophical, cultural, political, societal, psychological, and historical perspectives on knowing in mathematics as a discipline.
- 955 Contemporary Issues in Science Curriculum and Teaching**
Fall. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
Epistemological, social, psychological, and historical foundations of science education in relation to contemporary issues and problems of science curriculum, teaching, and policy.
- 958 Using Literacy to Learn: Curriculum and Pedagogy**
Fall. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. R: Open only to Ph.D. students in the College of Education.
Centrality of oral and written language in all school learning. Curriculum as text and instruction as discourse. Historical development of literacy curriculum and pedagogy as conceptualized and enacted in school settings. Language of teaching and learning in the classroom.

Teacher Education—TE

- 959 Acquisition and Development of Language and Literacy**
Spring. 3(3-0) Interdepartmental with Counseling, Educational Psychology and Special Education. R: Open only to Ph.D. students in the College of Education.

Literacy development including oral language base from birth through adulthood. Oral and written language development and learning in and out of school. Sociocultural contexts in relationship to schooling. Cross-cultural and international literacy development. Schooling, global economy, world health, and post-colonialism.

- 960 Language, Literacy, and Educational Policy**
Fall of odd years. 3(3-0)

Policy in relation to framing curriculum. The linguistic nature of pupil assessment. Gatekeeping functions of schools.

- 965 The Craft of Policy Analysis in Education**
Spring of odd years. 3(3-0)

Framing problems, devising alternative solutions, and predicting impacts.

- 970 Curriculum and Pedagogy in Teacher Education**
Spring of even years. 3(3-0)

Teacher learning opportunities at the preservice, induction, and inservice levels. Intended and enacted curriculum, sources of pedagogy, and their impact on teachers' knowledge, skills, and attitudes.

- 971 Teacher Learning in School Settings**
Fall of odd years. 3(3-0)

Research about school-based learning by prospective, beginning, and experienced teachers. Observation, conversation, writing, and classroom research as tools for improving teaching.

- 975 Policy Perspectives on Teaching and Teacher Education**
Fall of even years. 3(3-0)

Policy issues such as teacher accountability, teacher knowledge, and political influence.

- 982 Seminar in Curriculum, Teaching, and Educational Policy**

Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course.

Intensive study in an area of curriculum, teaching, and learning; educational policy and social analysis; or teacher education and teacher learning.

- 990 Independent Study**

Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to doctoral students.

Supervised individual study in an area of curriculum, teaching, and educational policy.

- 991 Special Topics in Curriculum, Teaching, and Educational Policy**

Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course.

- 991A Special Topics in Science Education**

Spring of even years. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course.

Special topics in science education.

- 994 Laboratory and Field Experience in Curriculum, Teaching, and Educational Policy**

Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to doctoral students. Approval of department.

Supervised practica, observations, and internships in an area of educational policy and social analysis, teacher education and teacher learning, and curriculum, teaching and learning.

- 995 Research Practicum in Curriculum, Teaching, and Educational Policy**

Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Open only to doctoral students in the College of Education. Approval of department.

Supervised research practicum. Design, execution, analysis, presentation, critique, and revision of research projects.

- 999 Doctoral Dissertation**

Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 100 credits in all enrollments for this course. R: Open only to doctoral students in the Department of Teacher Education.

Doctoral dissertation research.

- 223 Fundamentals of Automation and Controls**

Fall. 4(3-2) P: (TSM 121) Not open to students with credit in AE 083.

On-off controllers for electric actuators. Installation according to code. Ladder-logic. Programmable logic controllers. Installation and programming. Interfacing to a computer.

- 224 Digital Systems, Sensors and Measurements**

Spring. 3(3-3) P: (TSM 121 or PHY 184) Not open to students with credit in ECE 230.

Electrical components in transient and steady state operation. Thermo-electric, piezoelectric, magnetic, resistive and capacitive sensors. Electro-optical devices. Digital circuits. Data acquisition. Field trip required. Offered first ten weeks of semester.

- 341 Power and Machinery Systems**

Fall. 3(2-2) P: (PHY 231 and TSM 122 and TSM 223 and TSM 224 and CEM 141) or (BE 456 and TSM 224 and CEM 141) or (LBS 171 and TSM 122 and TSM 223 and TSM 224 and LBS 172) or (BE 456 and TSM 224 and LBS 172)

Principles, performance, operation, and management of agricultural machine systems and tractors.

- 342 Power and Control Hydraulics**

Spring. 3(2-2) P: (TSM 341) or (BE 331 and ECE 345) Not open to students with credit in BE 430.

Properties of hydraulic fluids. Fixed and variable displacement pumps and motors. Control valves and circuitry. Measurement and analysis of hydraulic systems. Component selection.

- 343 Implementation of Precision Agriculture**
Spring. 3(2-2) P: (TSM 341 and GEO 221)

Global positioning systems (GPS), yield monitors, computer software. Analysis and interpretation of field maps. Variable-rate application. Economics of precision agriculture.

- 351 Information Technology in Agricultural Systems**

Fall. 3(2-2) P: (CSE101)

Applications and trends in information systems. Evaluation and use of computer systems, peripherals, networks, presentation systems, and communication systems.

- 481 Technology Systems Management - Capstone I (W)**

Fall. 3(3-0) P: (TSM 341 and TSM 342 and TSM 343 and TSM 351 and ABM 332) and completion of Tier I writing requirement. R: Open only to seniors.

Project management. Integration of technology systems concepts. Teamwork and leadership skills. Financial and time constraints. Ethics, safety, and liability. Expectations of society.

- 482 Technology Systems Management - Capstone II**

Spring. 3(0-6) P: (TSM 481)

Team project in technology systems management. Field trips required.

TECHNOLOGY SYSTEMS MANAGEMENT TSM

Department of Biosystems and Agricultural Engineering College of Agriculture and Natural Resources

- 121 Fundamentals of Electricity**

Fall. 4(3-2) P: (MTH 103 or MTH 116 or MTH 124 or concurrently) Not open to students with credit in AE071.

Application of Ohm's law. Kirchoff's laws. Series and parallel circuits. Inductive and capacitive reactance. Power factor. Practical single and three-phase electrical systems. Electromagnetic induction. Transformers. Environmental constraints in power use and production.

- 122 Alternating and Direct Current Machines**

Spring. 3(3-3) P: (TSM 121) Not open to students with credit in AE 084.

Types and characteristics of electric motors. Connecting, reversing and servicing of AC and DC motors and drives. Stepper motors. Variable frequency drives for induction motors. Offered first ten weeks of semester.