

Teacher Education—TE

- 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.

- 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.

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:M: (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:M: (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.

- 223 Fundamentals of Automation and Controls**
Fall. 4(3-2) P:M: (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:M: (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:M: (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:M: (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 Principles of Precision Agriculture**
Fall. 3(2-2) P:M: (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:M: (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:M: (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:M: (TSM 481)

Team project in technology systems management. Field trips required.

490 Independent Study
 Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Approval of department.

Supervised individual student research and study in technology systems management.

491 Special Topics
 Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Approval of the department.

Special topics in technology systems management.

TELECOMMUNICATION TC

Department of Telecommunication, Information Studies and Media College of Communication Arts and Sciences

100 The Information Society
 Fall, Spring, Summer. 3(3-0)
 Technological, industry and social trends in the information society. Telecommunication industries. Social policy involving information technologies and information services, including television, radio, cable TV, telephone, the Internet, New Media.

200 History and Economics of Telecommunication
 Fall, Spring, Summer. 4(4-0) P:M: (TC 100 and EC 201 or concurrently)
 Institutional, economic and content development of telecommunication including broadcasting, cable, new video technologies, and telephone and data transmission.

201 Introduction to Telecommunication Technology
 Fall, Spring, Summer. 4(4-0) P:M: (CSE 101 or concurrently or CSE 131 or concurrently or CSE 231 or concurrently) and (TC 100) and (MTH 106 or MTH 110 or MTH 116 or MTH 124 or MTH 132 or MTH 152H or MTH 201 or STT 200 or STT 201) or (MTH 103 and MTH 114) or designated score on Mathematics placement test.
 Operational principles of audio, data and video telecommunication technologies.

240 Introduction to Digital Media Arts
 Fall, Spring, Summer. 3(2-2) R: Open only to students in the Department of Telecommunication.
 Principles, processes, techniques and technology involved in the making of media messages, particularly in video, audio and digital media.

241 Principles of Interactive Media
 Spring. 3(3-0)
 The diverse scope and potential of interactive technologies and media. Brainstorming, planning, implementing, and troubleshooting applications and interfaces for interactive media. Basic principles of programming for interactivity.

310 Basic Telecommunication Policy
 Fall, Spring, Summer. 4(4-0) P:M: (TC 100 and TC 200 and TC 201)
 Policy in information, telecommunication, and media in the United States and abroad.

339 Digital Games and Society
 Spring. 3(3-0)
 Cultural, technological, and design evolution of interactive entertainment. Current and historical digital game genres, content, audience, and industries for commercial and non-commercial games. Critical examination of empirical research concerning social impacts of digital games.

342 Basic Video Design and Production
 Fall, Spring, Summer. 4(2-4) P:M: (TC 240) and (TC 201) R: Open only to students in the Department of Telecommunication. Approval of department; application required.
 Conceptualization, design, planning, producing, directing, shooting, editing, and evaluation of video programs. Emphasis on multi-camera, live studio production. Introduction to location single-camera shooting and editing.

343 Basic Audio Production
 Fall, Spring, Summer. 4(2-4) P:M: (TC 201 and TC 240) R: Open only to students in the Department of Telecommunication. Approval of department; application required.
 Basic audio production techniques. In-depth audio and radio industry analysis. Media writing.

346 Basic Interactive Media Design
 Fall. 4(2-4) P:M: (TC 201) and (TC 240) R: Approval of department, application required.
 Basic design and development of interactive digital media, particularly related to Internet applications.

352 Broadcast and Cable Programming and Audience Promotion
 Spring of even years. 3(3-0) RB: (TC 200 and TC 240) R: Not open to freshmen or sophomores.
 Evaluation, selection and scheduling of cable and broadcast programming. Audience promotion strategies and techniques.

361 Data Communication
 Fall, Spring. 3(3-0) P:M: (TC 200 and TC 201) and (MTH 103 and MTH 114) or (MTH 116 or MTH 132) RB: (TC 310)
 Data communication concepts and applications. Basic data communications protocols and local area network approaches. Fundamentals of databases.

375 New Media, Old Media
 Fall. 3(3-0) P:M: (TC 100) RB: or approval of department.
 Uses and social effects of the Internet and the other New Media of communication. Conventional theories of mass media and emerging theories of interactive media processes and effects. Critical examination of empirical social science research concerning the role played by the media, old and new, in society.

391 Special Topics in Telecommunication
 Fall, Spring. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department.
 Contemporary issues in telecommunication.

410 Advanced Telecommunication Policy
 Spring of even years. 3(3-0) P:M: (TC 310) RB: (TC 100 and TC 200 and TC 201)
 Information and communication industries policy in the network of networks of the information society.

442 Advanced Video Design and Production (W)
 Fall, Spring, Summer. 4(2-4) P:M: (TC 342 and TC 343) and completion of Tier I writing requirement. R: Open only to juniors or seniors in the Department of Telecommunication. Approval of department; application required.
 Advanced principles of video production. Techniques of design, recording, editing and writing.

443 Audio Industry Design and Management (W)
 Fall, Spring. 4(2-4) P:M: (TC 342 and TC 343) and completion of Tier I writing requirement. R: Open only to juniors or seniors in the Department of Telecommunication. Approval of department; application required.
 Advanced audio production specializing in multi-channel techniques. Industry focus on all aspects of the audio field.

444 Information Technology Project Management
 Spring. 3(3-0) Interdepartmental with Information Technology Management; Computer Science and Engineering. Administered by The Eli Broad College of Business. P:M: (ITM 311) R: Open only to seniors in the Specialization in Information Technology.
 Practical training and experiences in design, testing, and launch of new information technologies and systems.

445 Digital Game Design (W)
 Spring. 4(2-4) P:M: (TC 240 and TC 346) and completion of Tier I writing requirement. R: Approval of department. Application required.
 Design, architecture, and creation concepts related to the development of interactive digital games.

446 Advanced Interactive Media Design (W)
 Spring. 4(2-4) P:M: (TC 201 and TC 240 and TC 346) and completion of Tier I writing requirement. R: Approval of department; application required.
 Advanced design and development of interactive digital media, particularly related to CD-ROM, DVD, computer kiosks, and advanced Internet applications.

447 Three Dimensional Graphics Design(W)
 Spring. 4(2-4) P:M: (TC 346) and completion of Tier I writing requirement. RB: A course in basic script writing and programming is required. R: Approval of department, application required. SA: TC 847
 Design of objects and environments for use as 3-D graphic artwork, computer animation, and real-time, interactive virtual environments: 3-D modeling, texturing, lighting, object and basic human animation.

448 Special Topics in Digital Media Arts and Technology
 Fall, Spring. 1 to 4 credits. A student may earn a maximum of 15 credits in all enrollments for this course. P:M: (TC 240) and (TC 342 or TC 343 or TC 346) R: Approval of Department, application required.
 Emergent topics in digital media arts and technology.