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.

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.

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

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

99A 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.

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.

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

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.

TSM SYSTEMS MANAGEMENT

Department of Biosystems and Agricultural Engineering  

121 Fundamentals of Electricity  
Fall. 4/3(2-2) P.M: (MTH 103 or MTH 116 or MTH 124 or concurrently) Not open to students with credit in AE 084.

122 Alternating and Direct Current Machines  
Spring. 3(3-3) P.M: (AE 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: (CSE 101) 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.
Arts and Sciences  
College of Communication  

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<tr>
<td>490</td>
<td>Independent Study</td>
<td>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.</td>
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<tr>
<td>491</td>
<td>Special Topics</td>
<td>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.</td>
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**TELECOMMUNICATION TC**

**Department of Telecommunication, Information Studies and Media**
**College of Communication**

**Arts and Sciences**

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<tr>
<th>Code</th>
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| 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) R: Open only to students in the Department of Telecommunication.  
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)  
| 342   | Basic Video Design and Production                                           | Fall, Spring, Summer. 4(4-0) 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(4-0) 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. |
| 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, Summer. 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                                                         | Spring, 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. |

**Advanced Telecommunication Policy**

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| 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. 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. |