

TECHNOLOGY (TEC)

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Chairperson: Ted Branoff.

Office: 215 Turner Hall.

Graduate Program Director: Klaus Schmidt.

Graduate Faculty: Boser, Branoff, Brown, Devine, Gokhale, Jo, Merrill, Park, Reifschneider, Schmidt, Shim, Solanki, Wilson, Xie.

Programs Offered

M.S. in Technology with sequences in Project Management, Quality Management and Analytics, STEM Education and Leadership, and Training and Development; certificates in Project Management, Quality Management and Analytics, STEM Education and Leadership, and Training and Development.

Program Requirements

Students must select one of two options (30 semester hours including thesis or 33 semester hours with a comprehensive exam) in completing the M.S. degree. Required core courses include: TEC 445 and 497.

Students must also complete courses selected from the following: TEC 400- and/or 300-level technical courses (if approved for graduate credit) and/or approved courses from other departments and schools. No more than nine hours may be taken in a combination of TEC 400, and 498 general courses. Students may select courses in other departments and schools only by advisement. All master's degree programs require a minimum of 50 percent of non-thesis credit hours applied to the degree to be 400-level courses or above.

Project Management Sequence:

Option I—Thesis: This 30 hour sequence requires:

- 6 hour core: TEC 445 & 497
- 9 hours: TEC 430, 431, and 432
- 6 hours: TEC 499
- 9 hours of electives, selected through advisement

Option II—Non-Thesis: This 33 hour sequence requires

- 6 hour core: TEC 445 & 497
- 9 hours: TEC 430, 431, and 432
- a comprehensive experience
- 18 hours of electives, selected through advisement

Quality Management and Analytics Sequence:

Option I—Thesis: This 30 hour sequence requires:

- 6 hour core: TEC 445 & 497
- 9 hours: TEC 437, 438, & 439
- 6 hours: TEC 499
- 9 hours of electives, selected through advisement

Option II—Non-Thesis: This 33 hour sequence requires

- 6 hour core: TEC 445 & 497
- 9 hours: TEC 437, 438, & 439
- a comprehensive experience
- 18 hours of electives, selected through advisement

STEM Education and Leadership Sequence:

Option I—Thesis: This 30 hour sequence requires:

- 6 hour core: TEC 445 & 497
- 9 hours: TEC 423, 424, & 425
- 6 hours: TEC 499
- 9 hours of electives, selected through advisement

Option II—Non-Thesis: This 33 hour sequence requires

- 6 hour core: TEC 445 & 497
- 9 hours: TEC 423, 424, & 425
- a comprehensive experience
- 18 hours of electives, selected through advisement

Note: Licensed teachers pursue the degree for professional development. Non-licensed students also may pursue the master's degree in conjunction with other undergraduate courses required for teacher licensure. University requirements for master's degrees are listed elsewhere in this catalog.

Training and Development Sequence:

Option I—Thesis: This 30 hour sequence requires:

- 6 hour core: TEC 445 & 497
- 9 hours: TEC 406, 407, & 408
- 6 hours: TEC 499
- 9 hours of electives, selected through advisement

Option II—Non-Thesis: This 33 hour sequence requires

- 6 hour core: TEC 445 & 497
- 9 hours: TEC 406, 407, & 408

- a comprehensive experience
- 18 hours of electives, selected through advisement

Graduate Certificate Programs

Courses completed as a portion of the Department of Technology Graduate Certificate programs may also be counted toward the requirements of the Master of Science in Technology degree. No transfer credit may be counted toward completion of certificates. Students must petition for certificate eligibility.

Note: Students must apply for the certificate before beginning coursework.

Project Management Graduate Certificate

The department offers a graduate certificate in Project Management. This certificate requires successful completion with a grade of B or better in each of TEC 430, 431, and 432. The content for these courses was identified through analysis of the Project Manager's Body of Knowledge developed by the Project Management Institute (PMI) organization and is consistent with those standards. This is not an advanced Project Management Professional (PMP) certification examination preparation program.

Quality Management and Analytics Certificate

The department offers a graduate certificate in Quality Management and Analytics. This certificate requires successful completion with a grade of B or better in each of the following three courses: TEC 437, 438, and 439.

STEM Education and Leadership Certificate

The department offers a graduate certificate in STEM Education and Leadership. This certificate requires successful completion with a grade of B or better in each of the following courses: TEC 423, 424, and 425. This certificate is not tied to teacher licensure in the State of Illinois.

Training and Development Certificate

This certificate requires successful completion with a grade of B or better in each of TEC 406, 407, and 408. Course content was identified through analysis of American Society for Training and Development (ASTD) and International Board of Standards for Training, Performance and Instruction (IBSTPI) standards and recommendations and is consistent with those recommendations and standards.

Technology Courses

303 ENGINEERING DESIGN

3 sem. hrs.

Foundational concepts of engineering design including

history, technology, tools, computer applications, pedagogical, and professional issues. Lecture and lab. Materials charge optional. Prerequisites: TEC 216; MAT 108 and PHY 105 or concurrent registration.

304 MEDICAL, AGRICULTURAL, AND BIO-RELATED TECHNOLOGIES

3 sem. hrs.

A study of technological systems related to medical, agricultural, and bio-related technologies. Lecture and lab. Prerequisite: TEC 101.

305 TEACHING TRANSPORTATION, ENERGY, AND POWER TECHNOLOGIES

3 sem. hrs.

Instruction and practice developing, teaching, and assessing transportation, energy, and power technologies curricula using a standards-based approach. Lecture and lab. Prerequisites: TEC 101 or 301 or demonstrated equivalent competencies; TEC 111 and 116 or concurrent registration.

306 COORDINATION TECHNIQUES OF CAREER AND TECHNICAL COOPERATIVE EDUCATION PROGRAMS

3 sem. hrs.

Coordination techniques needed for high school and post-secondary teacher coordinators in integrating classroom activities with daily employment. Includes Clinical Experience. Also offered as BE 382 and FCS 382.

307 COMPETENCIES FOR TEACHING

4 sem. hrs.

Curriculum planning, teaching, and evaluation strategies, and professionalism for Technology Education teachers. Includes Clinical Experience. Lecture. Prerequisites: TCH 216 and TEC 305 or concurrent registration. Concurrent registration in Student Teaching or within one semester.

310 STEM EDUCATION FOUNDATIONS

3 sem. hrs.

Foundations of pedagogical content knowledge for developing, implementing, and assessing integrated/interdisciplinary science, technology, engineering, and mathematics (STEM) education at the secondary level. Prerequisites: Education major, graduate standing, or practicing teacher.

313 QUALITY SYSTEMS FOR TECHNOLOGY

3 sem. hrs.

Use of statistical methods involving control charts, paretos, histograms, scattergrams, flow charts, and problem-solving techniques to manage and improve quality. Prerequisites: MQM 100; MAT 120; 8 hours in a Technology sequence completed. Major or minor only or consent of the department advisor.

317 COMPUTER-AIDED RENDERING AND ANIMATION**3 sem. hrs.**

Using computer systems to create renderings and animated presentations of design ideas in an industrial or architectural setting. Lecture and lab. Prerequisites: TEC 116 or 217. Major or minor only or consent of the department advisor.

319 GRAPHIC SOFTWARE INTERFACES**3 sem. hrs.**

Combination of graphic and programming techniques to interpret and solve of technological problems and enhance productivity. Lecture and lab. Formerly COMPUTER GRAPHICS. Prerequisites: Grade of C or better in TEC 283. Major or minor only or consent of the department advisor.

320 PROJECT MANAGEMENT**3 sem. hrs.**

Fundamentals of project management emphasizing planning techniques to meet stakeholder expectations regarding project scope, time, cost, and quality. Lecture. Prerequisites: TEC 270 and a minimum of 60 hours completed. Major or minor only or consent of the department advisor. Not available for graduate credit if had TEC 431 or 432.

322 BUILDING CODES AND INSPECTIONS**2 sem. hrs.**

Analysis of model building codes and their application and administration for minimum standards of public safety and welfare. Lecture. Prerequisites: TEC 120 and a minimum of 45 hours completed. Major or minor only or consent of the department advisor.

325 COMPUTERIZED ESTIMATING AND SCHEDULING**3 sem. hrs.**

Integrated approach to computerized estimating and scheduling as methods of project control. Prerequisites: TEC 222, 224, and 229. Major or minor only or consent of the department advisor.

326 CONSTRUCTION FINANCE AND ACCOUNTING**3 sem. hrs.**

Practical application of financial and accounting fundamentals specific to the construction industry. Lecture and lab. Prerequisites: ACC 131; ECO 105; and MAT 120. Major or minor only or consent of the department advisor.

327 DESIGN OF BUILDING STRUCTURES**3 sem. hrs.**

Analysis and design of permanent and temporary structural systems for wood, steel, and concrete construction. Prerequisites: TEC 292; MAT 120; and PHY 105.

Major or minor only or consent of the department advisor

328 RESIDENTIAL DEVELOPMENT**3 sem. hrs.**

Principles and practices of residential development including land acquisition and improvement, regulations, construction, and sales. Lecture. Prerequisites: ECO 105; TEC 229, and a minimum of 45 hours completed. Major or minor only or consent of the department advisor.

329 SUSTAINABLE BUILDINGS AND URBAN DEVELOPMENT**3 sem. hrs.**

Principles and practices of sustainable development in urban environments including building, transportation, and neighborhoods. Lecture. Prerequisites: TEC 120 and a minimum of 45 hours completed. Major or minor only or consent of the department advisor.

330 APPLIED ECONOMIC ANALYSIS FOR TECHNOLOGISTS**3 sem. hrs.**

Applied economic techniques used to determine the relative worth of alternative systems, products, and services. Lecture and lab. Prerequisites: MAT 120; six credit hours of 200-level Technology coursework. Major or minor only or consent of the department advisor.

333 GEOMETRIC DIMENSIONING AND TOLERANCING**3 sem. hrs.**

Interpretation and application of geometric dimensioning and tolerancing. Includes inspection of parts using a coordinate measuring machine. Lecture and lab. Prerequisites: TEC 130 and 216 or demonstrated equivalent competencies. Major or minor only or consent of the department advisor.

345 PROCESS CONTROL NETWORKS**3 sem. hrs.**

Programmable Logic Controller (PLC) programming within process control networks connecting machines, devices, sensors, and computers. Lecture and lab. Materials charge optional. Prerequisites: TEC 240 and 263 or demonstrated equivalent competencies. Major or minor only or consent of the department advisor.

348 SELECTED TOPICS IN COMPUTER SYSTEMS TECHNOLOGY**3 sem. hrs.**

Study of advanced topics in computer technology, with laboratory experiences that apply current knowledge and skills. Lecture and lab. Materials charge optional. Multiple enrollments allowed if content is different; maximum of 6 hours (see topics below). Prerequisites: TEC 245 and completion of 75 hours or consent of instructor. Major or minor only or consent of the department advisor.

350 PACKAGE DESIGN AND PRODUCTION**3 sem. hrs.**

Study of design, materials, and production processes used in the manufacture of packages and displays. Lecture, lab, and field trips. Materials charge optional. Formerly FLEXOGRAPHY. Prerequisites: TEC 116 and 257. Major or minor only or consent of the department advisor.

351 CROSS-MEDIA TECHNOLOGY**3 sem. hrs.**

Technology and processes used in cross-media production, with emphasis on interactive digital print products. Lecture and lab. Formerly ADVANCED IMAGE TRANSFER SYSTEMS. Prerequisites: TEC 250. Major or minor only or consent of the department advisor.

352 PREPRESS TECHNOLOGY**3 sem. hrs.**

Utilization of advanced pre-press methods and technologies in the creation and management of print media. Lecture, labs, and field trips. Materials charge optional. Formerly ADVANCED PREPRESS TECHNOLOGY. Prerequisites: TEC 250. Major or minor only or consent of the department advisor.

353 COLOR MANAGEMENT**3 sem. hrs.**

Study of color theory and measurement, device calibration and profiling, color reproduction variables, color proofing, and color management workflow. Lecture, labs, and field trips. Materials charge optional. Prerequisites: TEC 253. Major or minor only or consent of the department advisor.

354 PRINT PRODUCTION PLANNING AND PROFITABILITY**3 sem. hrs.**

Printing production workflow analysis, cost estimating, scheduling, job costing, and profitability. Use of computer-assisted management software. Lecture. Prerequisites: MAT 120; TEC 257. Major or minor only or consent of the department advisor.

356 GRAPHIC COMMUNICATIONS BUSINESS PRACTICES**3 sem. hrs.**

Current management trends in the profession, with specific emphasis on production management and legal issues for graphic communication businesses. Lecture. Prerequisites: TEC 257. Major or minor only or consent of the department advisor.

358 E-PUBLISHING MANAGEMENT**3 sem. hrs.**

Study of ePublishing technology, media production management, and digital asset management for graphic communications businesses. Lecture, labs, and field

trips. Materials charge optional. Formerly DIGITAL MEDIA MANAGEMENT. Prerequisites: TEC 152 and 250. Major or minor only or consent of the department advisor.

370 SUPPLY CHAIN LOGISTICS**3 sem. hrs.**

Supply chain networks for technology-based companies. Activities associated with transforming goods from raw materials through delivery to end user. Prerequisites: TEC 270 or concurrent registration. A minimum of 60 hours completed or graduate standing. Major or minor only or consent of the department advisor.

378 E-COMMERCE**3 sem. hrs.**

A study of technological concepts, business models, entrepreneurship, and policy related to e-transactions in trade and commerce. Lecture and lab. Not for credit if had TEC 348A06. Prerequisites: TEC 283. Major or minor only or consent of the department advisor.

383 TELECOMMUNICATIONS TECHNOLOGY**3 sem. hrs.**

Interfacing computers locally and through telecommunications networks. Identification of existing standards and hardware and evaluation of specific interfacing needs. Lecture and lab. Materials charge optional. Prerequisites: IT 254 or TEC 243. Major or minor only or consent of the department advisor.

390 COMPUTER SYSTEMS APPLICATIONS**3 sem. hrs.**

Development of managers and supervisors with technical and professional background in communications, networking, and interfacing, related to computer systems. Lecture and lab. Materials charge optional. Formerly INDUSTRIAL COMPUTER APPLICATIONS. Prerequisites: PHY 105; TEC 270; 9 senior hours of technical courses in Computer Systems Technology. Major or minor only or consent of the department advisor.

392 MANUFACTURING ORGANIZATION AND MANAGEMENT**3 sem. hrs.**

The study of industrial production systems including product, manufacturing, and plant engineering through the managing of a production project. Lecture and lab. Materials charge optional. Prerequisites: TEC 398A02 or 400 hours of documented engineering technology related work experience, plus TEC 270 and 9 senior hours of technical coursework in the Engineering Technology and senior standing or consent of instructor. Major or minor only.

394 CONSTRUCTION MANAGEMENT AND ADMINISTRATION**3 sem. hrs.**

Principles, practices, and standard documentation utilized in construction project management and administration. Lecture and lab. Prerequisites: TEC 226; 325 or concurrent registration; TEC 398 or 800 hours documented construction experience. Major or minor only or consent of the department advisor.

400 INDEPENDENT STUDY**1-4 sem. hrs.; Department recommends 3 sem. hrs.**

A maximum of six hours may be applied toward a master's degree. Intensive research study in an area of student's interest under a qualified member of the faculty. Each individual investigation is to culminate in a comprehensive written report and/or examination. Multiple enrollments allowed for a maximum of six hours. Prerequisites: TEC 349 and 497. (Refer to Index for General Courses.)

404 SPECIAL PROJECTS IN INDUSTRIAL TECHNOLOGY**1-3 sem. hrs.**

Investigation of selected areas of industrial technology which may include laboratory work. Each individual investigation is to include a project and a comprehensive written report and/or examination. A written proposal approved by the faculty member, the student's advisor and the department chairperson is required prior to registration. Multiple enrollments allowed for a total of six hours. Prerequisites: TEC 349 and 497.

406 INSTRUCTIONAL PROGRAM DESIGN FOR INDUSTRIAL TRAINING**3 sem. hrs.**

Study and applications of the theories and methods used in the development of contemporary industrial training and industrial education curricula.

407 INSTRUCTIONAL PROGRAM DEVELOPMENT FOR INDUSTRIAL TRAINING**3 sem. hrs.**

Provides competencies required for identifying training objectives and implementing industrial training programs utilizing effective contemporary instructional and delivery methods. Prerequisite: TEC 406.

408 INSTRUCTIONAL PROGRAM IMPLEMENTATION AND EVALUATION FOR INDUSTRIAL TRAINING**3 sem. hrs.**

Provides competencies required for analyzing and evaluating industrial training workshops and programs by conducting process and product evaluations. Prerequisite: TEC 406.

423 STEM EDUCATION LEARNING THEORIES**3 sem. hrs.**

Learning theory as it pertains to the learning, design and implementation of instruction in integrated/interdisciplinary science, technology, engineering, and mathematics (STEM) education. Formerly TEC 489.14 STEM LEARNING THEORIES. Prerequisites: TEC 310 or concurrent registration or consent of the instructor.

424 STEM EDUCATION INTEGRATED CURRICULUM**3 sem. hrs.**

Unique aspects of identifying, researching, developing, and teaching an integrated science, technology, engineering, and mathematics (STEM) curriculum. Formerly TEC 489.15 STEM INTERDISCIPLINARY CURRICULUM. Prerequisite: TEC 310 or concurrent registration or consent of the instructor.

425 STEM EDUCATION LEADERSHIP**3 sem. hrs.**

Reflective practitioner and school-based leadership knowledge and skills within the context of science, technology, engineering, and mathematics (STEM) education. Formerly TEC 489.17 STEM LEADERSHIP. Prerequisites: TEC 423 and 424.

430 PROJECT LEADERSHIP**3 sem. hrs.**

Principles, practices, and methods for providing leadership to work groups and teams engaged in the completion of complex projects.

431 PROJECT INITIATION AND PLANNING**3 sem. hrs.**

Project management principles and methods applied in project initiation, scope definition, planning and scheduling, and cost control.

432 PROJECT IMPLEMENTATION AND CONTROL**3 sem. hrs.**

Advanced concepts in project management including computerized scheduling and cost control, quality systems, and project termination. Prerequisite: TEC 431.

437 QUALITY AND ORGANIZATIONAL EXCELLENCE**3 sem. hrs.**

Application of quality management practices to customer/supplier relations, strategic planning and deployment, and measurement systems to improve organizational performance.

438 PROJECT RISK AND DECISION ANALYSIS**3 sem. hrs.**

Quantitative spreadsheet-based analytical modeling techniques applied to solve decision problems and risk situations faced by project managers.

**439 INTRODUCTION TO SIX SIGMA
METHODOLOGIES****3 sem. hrs.**

Overview and application of Six Sigma data-driven decision making methodologies. Gain insight into advanced quality based industrial management techniques.

**445 STATISTICS IN APPLIED SCIENCE AND
TECHNOLOGY****3 sem. hrs.**

Descriptive and inferential statistics in the applied sciences; statistical analysis using current technology. Also offered as AGR/FCS/KNR 445.

**491 INTERNSHIP IN COLLEGE TEACHING IN
INDUSTRIAL EDUCATION****3 sem. hrs.**

Credit for the course is given in the School of Teaching and Learning. (See TCH 491.)

**497 INTRODUCTION TO RESEARCH
METHODOLOGY****3 sem. hrs.**

Selection of a research problem, collection of data, types of research, the research report and use of the library in connection with the research problem. Emphasis on understanding and interpreting frequently used statistical concepts. Provides a background for the preparation of the thesis. Prerequisites or concurrent registration: Three semester hours of statistics at the undergraduate or graduate level.

**498 PROFESSIONAL PRACTICE IN INDUSTRIAL
TECHNOLOGY****1-8 sem. hrs.**

Refer to Index for General Courses.

499 MASTER'S THESIS**1-6 sem. hrs.**

Refer to Index for General Courses.

**499A90 INDEPENDENT RESEARCH FOR THE
MASTER'S THESIS FINAL TERM****1 sem. hr.**

Refer to Index for General Courses.