

ENGINEERING TECHNOLOGY

TECHNICAL

CONTACT PERSON: David Sagsveen • Jack Science Center 301C 224-5443 • David.Sagsveen@bsc.nodak.edu

Statewide projections continue to show very high or exceptional growth descriptors for Engineering Technologists in most disciplines for the next several years.

BSC's Engineering Technology program leads to an Associate in Applied Science degree. The program is aligned most directly towards Civil Engineering Technology with most graduates gaining employment as drafters, estimators, surveying assistants, inspectors, and material testers. Graduates can also gain employment in related engineering and construction fields as estimators, drafters, site personnel and project managers.

Engineering Technologists work for a variety of employers including federal, state, county or local governments. They also work for private engineering or testing firms, utilities, mining and power companies, and construction firms.

In the Engineering Technology program, students learn how to utilize graphic techniques to produce engineering documents, how to conduct standardized field and laboratory tests on civil engineering materials, how to utilize modern surveying methods for land measurement and/or construction layout, how to determine forces and stresses in elementary structural systems, and how to design simple beams in elementary structural systems. Additionally, students will learn how to describe the participants, terms, contract provisions, and construction processes of a typical construction project, how to estimate material quantities for technical projects, how to employ productivity software to solve technical problems, how to communicate lab and field testing and surveying results, and finally how to describe the fundamental components and processes of water and wastewater collection, distribution, and treatment systems.

Students entering this program can expect to use algebra and trigonometry skills in several of the courses. Basic computing skills including keyboarding, word processing and spreadsheets are also necessary.

SUGGESTED CURRICULUM FOR ASSOCIATE IN APPLIED SCIENCE:

FRESHMAN

CREDITS

FALL SEMESTER

College Composition I (ENGL 110).....	3
Intro. to Computers (CSCI 101).....	3
Graphical Communication (ENGR 101)	3
Computer Aided Design I (CAD 211)	3
Pre-Calculus (MATH 107).....	5
Total credits.....	17

SPRING SEMESTER

CREDITS

Fundamentals of GIS (GIS 105)	3
Intro. to Professional Writing (ENGL 125)	3
Surveying I (ENGR 204)	3
Surveying I Lab (ENGR 204L).....	1
Computer Aided Design II CAD 212)	3
Materials Testing (CT 251)	3
Materials Testing Lab (CT 251L)	1
Total credits.....	17

SOPHOMORE

FALL SEMESTER

CREDITS

Fundamentals of Public Speaking (COMM 110)	3
Surveying II (ENGR 205).....	3
Surveying II Lab (ENGR 205L)	1
Computer Aided Design III (CAD 213).....	3
Applied Statics/Mechanics of Materials (CT 250)	4
Total credits.....	14

SPRING SEMESTER

CREDITS

Construction Project Management (CT 252).....	3
Water Management Technology (CT 232).....	4
State and Local Government (POLS 116)	3
Principles of Microeconomics (ECON 201).....	3
Introduction to Sociology (SOC 101)	3
Total credits.....	16

TOTAL PROGRAM CREDITS

64

* Students may take College Algebra (MATH 103) AND Trigonometry (MATH 105) instead of Pre-Calculus (MATH 107), keeping in mind that MATH 105 or MATH 107 are prerequisites for ENGR 204

TRANSFER OPTION

Students who may possibly pursue a four-year degree in engineering at a later date should consider the following course changes:

ADD:

MATH 165: Calculus I (4 credits) to the curriculum

SUBSTITUTE:

Statics (ENGR 201) and Mechanics of Materials (ENGR 203) for Applied Statics and Mechanics (CT 250). Students should consult with the Engineering Technology program coordinator prior to this substitution.

GIS CERTIFICATE OPTION

With the addition of a few more courses, students could also complete the GIS Certificate of Completion. Refer to the Geographic Information Systems Technician page for complete details on the Certificate of Completion.

ENGINEERING (CAD, CT, EE, ENGR, ME)

AUTOCAD (CAD)

CAD 211	Computer Aided Design I	F&S	3 credits
An introduction to computer-aided graphics, with an emphasis on two-dimensional drawings. Drafting is done with the aid of microcomputers using AutoCAD computer-aided drafting and modeling software. Prerequisite or corequisite: ENGR 101 or instructor approval.			
CAD 212	Computer Aided Design II	Fall	3 credits
A continuation of CAD I. Isometric and 3-D drawings are introduced. Advanced civil engineering topics, including structural, civil, and pipe drafting. Prerequisite: CAD 211 or instructor approval.			
CAD 213	Computer Aided Design III	Fall	3 credits
This course introduces students to the fundamental concepts of civil engineering and surveying 3D software techniques using the AutoCAD Civil3D program. Students learn how to work with point data, how to create and analyze surfaces, how to develop sites, roads, corridors, and pipe networks, how to work with survey data, and how to import and export data. Students will also learn how to create 2D and 3D civil engineering production drawings. Prerequisite: CAD 211 or instructor approval.			

CIVIL ENGINEERING AND SURVEYING TECHNOLOGY (CT)

CT 232	Water Management Technology	Spring	4 credits
This course covers the fundamentals of water supply and distribution, water treatment processes, sanitary sewage and collection methods, sewage treatment and the environmental effects caused by improper water and sewage handling. Included in the course are topics on hydraulics, chemical and biological testing, water distribution and collection systems and water and sewage treatment facilities. Prerequisite: MATH 105 or MATH 107.			
CT 250	Applied Statics and Mechanics of Materials	Fall	4 credits
Equilibrium of rigid-bodies and coplanar force systems, trusses, load tracing, centroids and centers of gravity, introduction to stress, strain, shear and bending moments, bending stress, shear stress and beam deflections, properties of materials, simple beam and column design, and connections. Prerequisite: MATH 105 or MATH 107.			
CT 251	Materials Testing	Spring	3 credits
Introduction to the physical and chemical properties of materials used in civil engineering projects including asphalt, Portland cement, aggregates and soils along with the proper sampling, testing and reporting procedures of these materials. Corequisite: CT 251L. Prerequisite or Corequisite: ENGL 125.			
CT 251L	Materials Testing Lab	Spring	1 credit
Field and office exercises in the sampling and testing of civil engineering materials. Labs are held at the ND Dept. of Transportation Materials and Research Lab. Corequisite: CT 251.			
CT 252	Construction Project Management	Spring	3 credits
An introduction to inspection procedures, management of quality controls of construction projects, estimating, print reading, and procedures used to administer construction specifications and contracts.			

ELECTRICAL ENGINEERING (EE)

EE 206	Circuit Analysis	Spring E0	3 credits
Introduction to electric circuit components. Fundamental laws of circuit analysis. Steady state and transient analysis of DC and AC circuits. Electric power calculations. Concurrent registration in EE 206L is required. Prerequisite: ENGR 201.			
EE 206L	Circuit Analysis Lab	Spring E0	1 credit
One hour of lab per week. Concurrent registration in EE 206 is required.			

ENGINEERING (ENGR)

ENGR 101 Graphical Communication

F&S

3 credits

Elementary space visualization of points, lines, planes, and solids on orthogonal projection; graphical expression of technical sketching; geometry; pictorial representation, and size specification; reproduction methods. Computer-aided drafting is introduced. Prerequisite or Corequisite: Math 105 or 107.

ENGR 201 Statics

Fall

3 credits

Vector approach to principles of statics. Resultants of force systems, equilibrium of force systems, analysis of structures, centroids, moments of inertia. Prerequisite or co-requisite: MATH 166.

ENGR 202 Dynamics

Spring

3 credits

Vector approach to principles of dynamics. Rectilinear and curvilinear translation, rotation, plane motion, force-mass-inertia, work-energy, impulse-momentum. Prerequisite: ENGR 201.

ENGR 203 Mechanics of Materials

Spring

3 credits

Simple stress and strain, torsion, shear and bending moment, flexural and shearing stresses in beams, combined stresses, deflection of beams, statically indeterminate members and columns. Prerequisite: ENGR 201.

ENGR 204 Surveying I

Spring

3 credits

Measurements and errors, measurements of distances and angles, differential leveling, traverse surveys, construction surveys, simple horizontal and vertical curves, and earthwork calculations. Prerequisites: MATH 105 or MATH 107 and CAD 211. Corequisite: ENGR 204L.

ENGR 204L Surveying I Lab

Spring

1 credit

Three hours of lab per week. Field and office exercises including data collection and computational techniques of surveying data. Corequisite: ENGR 204.

ENGR 205 Surveying II

Fall

3 credits

Compound and spiral curves horizontal curves, state plane coordinate system, U.S. public land surveys, boundary surveys an introduction to geodetic surveying, electronic data collection and reduction, and astronomical observations. Prerequisite: ENGR 204. Corequisite: ENGR 205L.

ENGR 205L Surveying II Lab

Fall

1 credit

Three hours of lab per week. Field and office exercises including data collection and computational techniques of surveying data. Corequisite: ENGR 205.

ENGR 206 Fluid Mechanics

BD

3 credits

This course covers fluid properties, fluid statics, fluid dynamics, transport theory and transport analogies, conservation of mass, energy and momentum, dimensional analysis, boundary layer concepts, pipe flows, compressible flow, and open channel flow. Prerequisite: ENGR 201.

ENGR 241 Thermodynamics I

Spring

3 credits

Fundamental concepts of thermal energy relationships, processes and cycles are introduced, including: first and second law of thermodynamics, entropy, and availability. Prerequisite: ENGR 201.

ENGR 294 Independent Study

1-3 credits

Independent or directed study of special topics in engineering. Department chairperson approval is required.

ENGR 299 Special Topics in Engineering

BD

1-3 credits

Repeatable up to six semester hours. An examination on of special topics in engineering.

ENGR 195-295 Service Learning

1-3 credits

Maximum of six semester hours. Service learning may be accomplished by one of three methods: Joining a club that has a public service component, doing volunteer work at a non-profit organization, or taking a course that links public service with its curriculum.

ENGR 197-297 Cooperative Education/Internship

F&S SM

1-3 credit hours each

Repeatable up to a maximum of six semester hours. Work hours are arranged by employer, adviser and student. Progress is checked by oral and written reports from the employer. Periodic student adviser conferences are required to discuss progress or problems. Students are required to submit an accounting of their experiences to their instructor. All co-op experiences are based on a satisfactory/unsatisfactory basis. Department chair approval is required.

MECHANICAL ENGINEERING (ME)

ME 213 Modeling of Engineering Systems

Fall

3 credits

Introduction to engineering systems, modeling, and computations; computer methods; analytical methods; verification tasks; case studies. Prerequisite: Calculus 165.