

AGRI467 (4)
Concepts of International Agriculture
 A study of the relative significance of the role of external institutions and agencies, financial programs for agricultural development, human resource development, and agricultural education as a means of fostering worldwide agricultural development.

AGRI468 (4)
International Agricultural Implementation
 The application of scientific agricultural principles of food production, utilizing cultural practices based on appropriate agricultural technologies that support a philosophy of sustainability for future generations.

AGRI498 (1-6)
Internship
 Field practicum on site.

AGRI499 (1-5)
Project in _____
 Individual research in some field of agriculture under the direction of the staff. Repeatable to 10 credits.

ENGINEERING, COMPUTER SCIENCE, AND ENGINEERING TECHNOLOGY

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A BS degree with a concentration in Industrial and Operations Engineering is offered entirely on the Andrews campus. This program prepares students to use analytical methods in the design of efficient production and service systems, and for either employment or graduate study. Electives may be chosen to place emphasis on health-care systems or production industries.

Professional Engineering

(first two years)

Required courses to be taken during the two years at Andrews: CHEM121, 122, 123; COMM104; COSC161; ENGL111, 112; ENGR120, 135, 225, 281, 282; MATH171, 172, 173, 281, 282, 283; MECT121, PHYS251, 252, 253, 261, 262, 263; Religion (8 credits); Social Studies and Humanities (8 credits).

Minor in Engineering

Required courses—30
 ENGR120, 225, 281, 282 or 300; plus 16-17 credits of engineering electives (may include ELCT152 and 172, 153 and 173, 204, 224, 324, 340, 385; MECT121, 386.

BS: Industrial and Operations Engineering

Major requirements—70
 BSAD355; ECON225, 226; ENGR120, 135, 225, 281, 282, 465; INDT320, 410, 440, 450, 460; MECT121; plus 16 credits selected from BSAD 436, 440; COSC162, 163, 436; ENGR224; INSY448; MATH401, 402, 427; MECT155; TCED254, 456.

Cognate requirements—63
 MATH171, 172, 173, 281, 282, 283; CHEM121, 122; COSC161; STAT251; PHYS251, 252, 253, 261, 262, 263.

MSA with Engineering Management Emphasis

See graduate programs for the School of Business, p. 156.

COMPUTER SCIENCE

For information on the BS in Computing with options in Computer Science and Software Systems, and the MS in Software Engineering, see the supplement to the bulletin.

Academic Programs	Credits
BS in Computing with options in Computer Science and Software Systems	
BS: Industrial and Operations Engineering	70
BS in Engineering Program	
First two years on Andrews campus and final two years at Walla Walla College, College Place, WA	
BSET: Computer Engineering Technology	60
BSET: Electronics Engineering Technology	60
Biomedical Electronics Technology	
Industrial Electronics Technology	
BSET: Mechanical Engineering Technology	60
BSIT: Electronics Technology	60
BSIT: Production Systems	60
AET: Computer Engineering Technology	40
AET: Electronics Engineering Technology	40
AET: Mechanical Engineering Technology	40
Minor in Electronics	30
Minor in Engineering	30
MS in Software Engineering	

Programs

ENGINEERING INTEGRATED FOUR-YEAR PROFESSIONAL ENGINEERING PROGRAM

Andrews University offers the first two years of an integrated four-year professional engineering program. The final two years of the Bachelor of Science in Engineering degree program are offered at Walla Walla College (College Place, WA). Students may specialize in civil, electrical, or mechanical engineering. The department at Andrews University may assist students by coordinating a program with another engineering school upon request.

ENGINEERING TECHNOLOGY

Engineering technology—the area of the technological employment spectrum between the engineer and the skilled craftsman—includes both the engineering technician (Associate of Engineering Technology) and the engineering technologist (Bachelor of Science in Engineering Technology).

Industrial technology—the portion of the technological employment spectrum between the skilled craftsman and management—combines the development of a technical skill with courses in industrial management.

SEQUENCE OF TWO-YEAR AND FOUR-YEAR PROGRAMS

then take a job in industry or continue their education another two years to earn a four-year baccalaureate degree.

BSET: Computer Engineering Technology

Major requirements—60

COSC125 (meets computer science General Education requirement), 161, 162, 163, 461; ELCT153, 171, 172, 173, 224, 305, 324, 424; ENGT495; plus 22 credits from COSC, INSY, and ELCT courses in consultation with an adviser.

Cognate requirements—8

MATH215 or 281 and MATH235 or 355 for the General Education requirements.

AET: Computer Engineering Technology

Major requirements—40

COSC125 (meets computer science General Education requirement), 161, 162, 163; ELCT151, 152, 153, 171, 172, 173, 224, 324; and 8 credits selected from COSC and ELCT courses in consultation with an adviser.

BSET: Electronics Engineering Technology

Major requirements—60

ELCT153, 161, 162, 163, 204, 224, 300, 314, 315, 316, 324, 340, 375, plus one of the following options:

Biomedical Electronics Technology—20

BIOL111, 112; ELCT436, 437; plus 4 credits selected from ELCT305, 345, 364, 385, 424; TCED251, 456 in consultation with electronics technology adviser.

or

Industrial Electronics Technology—20

ELCT330, 364; ENGT495; plus 12 credits selected from ELCT305, 345, 385, 424; MECT155, 410, 455; TCED251; ENGT390 in consultation with electronics technology adviser.

BSIT: Electronics Technology

Major requirements—60

ELCT151, 152, 153, 161, 162, 163, 204, 224, 300, 314, 315, 316, 324, 340; plus 18 credits selected from one of the options listed above in consultation with electronics technology adviser.

Cognate requirements—8

MATH162, 163.

AET: Electronics Engineering Technology

Major requirements—40

ELCT151, 152, 153, 161, 162, 163, 204, 224, 300, 324; MECT121; and 5 credits from ELCT305, 314, 315, 316, 340, 364, 375 chosen in consultation with electronics technology adviser.

Minor in Electronics

Minor requirements—30

ELCT151, 152, 153, 171, 172, 173, 204, 224

May not be offered each year.

ELCT345 \$ (4)
Microwaves and Transmission Lines
 Basic transmission line analysis using the Smith chart. Methods of generating, transmitting, detecting, and amplifying microwave signals. Includes lab. Prerequisites: ELCT340; MATH163. May not be offered each year.

ELCT364 \$ (4)
Pulse and Switching Circuits
 Pulse and switching circuits as applied to computers, communication systems, and test equipment. Includes linear waveshaping, clipping, clamping, gating, switching, and multivibrator circuits. Includes lab. Prerequisite: ELCT153. May not be offered each year.

ELCT375 \$ (4)
Linear Electronics
 A study of the specifications, capabilities, and applications of opamps, voltage regulators, and other related linear ICs. Applications to filtering and A/D conversion are emphasized. Includes a lab. Prerequisites: ELCT153; MATH163. May not be offered each year.

ELCT385 \$ (4)
Control Systems
 Analysis of electronic control circuits; feedback circuits, electronic timers, photoelectric devices, motor control, heating system control, servomechanisms. Includes a lab. Prerequisites: ELCT204; MATH163. May not be offered each year.

ELCT420 (4)
Avionics Equipment
 A study of operating principles and circuits of communication and navigation equipment used in general aviation. Prerequisite: ELCT324, 340. May not be offered each year.

ELCT424 \$ (4)
Microprocessor Application
 Microprocessor interfacing and applications in the area of process monitoring and control. Includes lab. Prerequisite: ELCT324. May not be offered each year.

ELCT436, 437 (3,3)
Biomedical Electronic Equipment
 Examines the specifications, operation procedures, servicing, and maintenance of the full range of biomedical electronic equipment. ELCT437 includes lab. Prerequisites: ELCT324, 375; BIOL112. May not be offered each year.

ENGINEERING MANAGEMENT

ENGM 510 (4)
Industrial Supervision
 The fundamentals of industrial supervision. Topics include organization, duties, human relations, training, evaluation, promotion, grievances, and management-employee relationships.

ENGM520 (4)
Ergonomics and Work Design
 The application of ergonomics and engineering principles to the design analysis and measurement of human work systems.

ENGM555 (4)

Facilities Planning
 Planning and design of industrial and service facilities: site selection, process layout, materials handling, and storage.

ENGM565 (4)
Operations Analysis and Modeling
 The development and use of mathematical models to analyze elements of production and service systems: linear programming, probabilistic models, game theory, dynamic programming, queuing theory, and simulation. Prerequisites: INDT460; STAT285; MATH163 or 172 or 182.

ENGM570 (3)
Project Management
 Design and management of engineering projects: proposals, planning, resource requirements, organization, scheduling, and cost and schedule control.

ENGM690 (1-4)
Independent Study (Topic)
 Individual study or research in some area of engineering management under the direction of a member of the engineering faculty.

ENGM698 (2)
Research
 Research methods and a research project in an area of engineering management.

ENGINEERING

ENGR120 (2)
Introduction to Engineering
 Explores specialized areas and job functions of engineers and technologists. A design project emphasizes the engineering design process. Introduces Mathcad.

ENGR135 (1)
Descriptive Geometry
 Solution of basic space problems. Determination of distances and angles, intersections of lines and surfaces, intersections and development of surfaces. Prerequisite: MECT121.

ENGR224 \$ (5)
Engineering Materials
 Study of the science of engineering materials. Engineering properties are correlated with internal structure and service environment. Weekly: a 3-hour lab. Prerequisite: CHEM121.

ENGR225 \$ (4)
Circuit Analysis
 Direct and alternating current circuits. Network theorems, graph theory, computer methods. Developing/solving integrodifferential equations. Weekly: a 3-hour lab. Prerequisite: MATH173.

ENGR248 (1-4)
Workshop
 Provides flexibility for the occasional workshop where it is appropriate to offer engineering credit. Workshop requirements must be approved by the department.

ENGR281 (3)
Statics for Engineers
 Principles of statics and their application to engineering problems; forces, moments, couples, friction, centroids, and moment of inertia. Prerequisite: MATH173.

ENGR282 (5)
Dynamics for Engineers
 Vectorial kinematics of moving bodies in fixed and moving reference frames. Kinetics of particles, assemblies of particles, and rigid bodies, with emphasis on the concept of momentum. Keplerian motion, moment of inertia, elementary vibrations, and con-

ENGT495 (1-4)

Design Project

A significant design project which culminates in a working system. Repeatable to 6 credits.

Prerequisite: at least one of the following courses: ELCT324, 375; INDT320, 460; MECT345 or 386.

INDUSTRIAL TECHNOLOGY

INDT310 (4)

Industrial Supervision

Introduction to and overview of the fundamentals of industrial supervision. Topics include organization, duties, human relations, training, evaluation, promotion, grievances, management-employee relationships. May not be offered each year.

INDT315 (4)

Succeeding in the Workplace

Focus on the development of attitudes, performance, and communication that will assist in making the transition from the classroom to the workplace an enjoyable and profitable experience.

INDT320 (4)

Work Methods and Measurements

Principles and applications of basic methods and techniques for improvement of the man-job-time relationship; job standards, time and motion studies, and work-space design for efficient use of manpower.

INDT410 (4)

Project Management

Methodology used successfully to carry out a