

Ogden College of Science and Engineering



Ogden College of Science and Engineering encompasses the applied and basic sciences, offering a broad range of degree programs in agriculture, biology, chemistry, computer science, construction management, engineering, geography, geology, architectural design, manufacturing sciences, mathematics, meteorology, and physics and astronomy. Ogden College also offers a cooperative doctoral program in chemistry with the University of Louisville.

In collaboration with the College of Education, Ogden College offers the SKyTeach Program for those interested in teaching science and math at middle or high school levels. This program is a replication of a nationally recognized program in teacher preparation developed at the University of Austin, Texas. WKU received \$2.4 M in funding from Exxon/Mobil through the National Mathematics and Science Initiative to develop the SKyTeach program at WKU.

Ogden College of Science and Engineering is recognized by the high quality and success of its students and graduates that result from personal attention to student professional development through engagement with faculty in projects that expand on classroom instruction. The College's mission is to create an academic environment of rigor and achievement, to cultivate a community of scholars, and to enhance interconnections among the disciplines.

Ogden College is located on the campus of an earlier education institution established in Bowling Green in 1877 as a provision in the will of Major Robert W. Ogden. The original Ogden College closed, and its properties were leased to WKU in 1928. The name Ogden reappeared when the Ogden College of Science and Technology was established within Western Kentucky University in 1965.

Those interested in more detailed information regarding programs offered by departments of the College should follow the links listed under departments or e-mail the dean of Ogden College of Science and Engineering directly.

Since 1993, students and faculty at WKU have benefited from its membership in Oak Ridge Associated Universities (ORAU). ORAU is a consortium of 98 colleges and universities and a contractor for the U.S. Department of Energy (DOE) located in Oak Ridge, Tennessee. ORAU works with its member institutions to help their students and faculty gain access to federal research facilities throughout the country; to keep its members informed about opportunities for fellowships, scholarships, and research appointments; and to organize research alliances among its members.

Through the Oak Ridge Institute for Science and Education (ORISE), the DOE facility that ORAU operates, our undergraduates, graduates, postgraduates, as well as our faculty enjoy access to a multitude of opportunities for study and research. Students can participate in programs covering a wide variety of disciplines including business, earth sciences, epidemiology, engineering, physics, geological sciences, pharmacology, ocean sciences, biomedical sciences, nuclear chemistry, and mathematics. Appointment and program length ranges from one month to four years. Many of these programs are especially designed to increase the numbers of underrepresented minority students pursuing degrees in science and engineering related disciplines.

For more information about ORAU and its programs, contact: Blaine R. Ferrell, Dean, Ogden College of Science and Engineering, ORAU counselor for WKU.

Dr. Blaine R. Ferrell, Dean

Dr. Andrew Ernest, Associate Dean

Dr. Bruce Kessler, Associate Dean

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Department of Agriculture

The complexity of the technological and financial structure of modern agriculture has made education increasingly important. It has also brought about a need for personnel to fill positions in various businesses and professions which support agriculture.

Processing and marketing of agricultural products and supplying of agricultural chemicals, machinery, seed, feed and other products require research, sales and service personnel who have met specific educational requirements. Governmental agencies which conduct research, extension, advisory and regulatory activities are staffed by highly trained agricultural personnel.

The Department of Agriculture strives to fill the needs of both the student who requires general technical knowledge for production agriculture and the student who needs more specialized training to pursue one of many careers. This is accomplished by offering specific curricula with enough flexibility to allow specialization within the curriculum.

Many students studying agriculture have urban backgrounds and lack farm experiences. The Department of Agriculture uses the University Farm and the Agricultural Exposition Center as integral parts of its laboratory and classroom instructional program to provide practical experiences. Internships and cooperative work experiences are encouraged for all students.

To complete the 120 semester hours required for a Bachelor of Science degree in agriculture, students must complete the basic curriculum and one of the specialization tracks. The basic curriculum includes the general education requirements and specialty support requirements as well as basic professional courses in agriculture. These concentrations are agribusiness, agricultural education, agronomy (plant science or soil science), animal science, horse science, dairy science, general agriculture, turf and golf course management, horticulture, pre-veterinary medicine and pre-forestry. These concentrations allow students to vary their course selection to better meet their particular area of interest. The student, in consultation with an assigned advisor, will choose specific courses, other than those required.

When planning a program of study, students should be aware of the University academic requirements and regulations contained in this catalog in the chapter "Academic Information." Specific attention should be given to the subsections in the chapter entitled (a) Academic Programs, (b) General Education Requirements, and (c) Academic Requirements and Regulations. Students should be aware that some academic programs may include additional scholastic regulations and standards not specified in the catalog. To obtain a copy of these regulations, students should contact the department head.

Agriculture majors who follow the listed guidelines can graduate in 4 years (8 semesters) or less.

Guidelines

1. Follow one of the undergraduate degree plans listed at the Agriculture Department website: www.wku.edu/agriculture.
2. Be advised by an assigned faculty advisor in the Department of Agriculture each semester and enroll in the courses decided upon at the advising session.
3. Excluding remedial classes, receive a passing grade for an average of 15 hours per semester for 8 semesters with a minimum 2.0 GPA and a minimum total of 120 hours, including 42 or more hours upper-division (300- and 400- level) courses. Complete the General Education requirements of the department and the university. Note specific required mathematics, biology and chemistry courses.
4. Deviation from any of these conditions might lead to the need for additional hours/courses and/or semester in order to graduate.

Major in Agriculture (No minor or 2nd major required.)

This major in agriculture (reference number 508) requires a minimum of 50 semester hours in agriculture and leads to a Bachelor of Science degree. Agriculture courses required for the major are AGRI 108, AGRO 110, ANSC 140, AGMC 170/171, AGRI 291, AGRO 320 or ANSC 345, AGRO 350, AGEC 360, AGRI 398 (Gen), AGRI 398 (Sp) and AGRI 494. Electives chosen from agriculture courses focusing on a concentration, when approved by an assigned advisor, complete the minimum total of 50 semester hours in agriculture. No other minor or major is required for the student following the curriculum for this major in agriculture. Students are required to complete specified courses in

Dr. Jack Rudolph, Head

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Professors: C. Anderson, R. Gilfillen
L. Gonzales, J. Rudolph, N. Speer,
T. Willian

Associate Professors: M. Stone, P. Woosley
Assistant Professors: F. DeGraves, S. King
Instructors: R. Dennis, K. Guffey, C. Scudder
Transitional Retirees: A. Bedel, J. Britt, E. Gray,
G. Jones, D. Stiles

biology, chemistry and mathematics. At least half of the semester hours in the major must be in courses numbered 300 or above.

Major in Agriculture (Minor or 2nd major required.)

This major in agriculture (reference number 605) requires completion of a minimum of 30 semester hours and leads to a Bachelor of Science degree. These hours must be taken in approved agriculture courses and a suitable major or minor(s) in other departments must be earned to total at least 54 approved semester hours. Agriculture courses required for a major are AGRI 108, AGRO 110, ANSC 140, AGMC 170/171, AGRI 398 (Gen.), AGRI 398 (Sp) and AGRI 494. Electives chosen by the student and approved by an assigned advisor provide sufficient credits to satisfy an option. In addition, majors are required to complete specified courses in biology, chemistry and mathematics. At least half of the semester hours in the major must be in courses numbered 300 or above.

Minor in Agriculture

The minor in agriculture (reference number 308) requires a minimum of 18 approved semester hours in agriculture, including AGRI 494 with at least half of the courses numbered 300 or above.

Associate of Science Degree in Agricultural Technology and Management

Turf and Golf Course Management Option

This program (reference number 205) is a program designed for individuals interested in becoming superintendents of golf courses, athletic fields and parks and recreational facilities, lawn care professionals, and cemetery caretakers. The course of study includes the care and growing of warm and cool season grasses, turf disease management, and equipment management and maintenance. A total of 67 hours of specific courses are required for this program. The curriculum for this program is outlined in the Department of Agriculture Student Planning Manual.

General Agriculture Option

This two-year curriculum is designed to fulfill the needs of students primarily interested in the application of modern agricultural technology (reference number 205). Agriculture courses required for the general option in this degree are AGRI 108, 269 and 398, AGRO 110, ANSC 140*, AGMC 170/171, AGECE 365, 360 and 361. Also required are ENG 100, COMM 145 or 161, MATH 116, CHEM 105/106, a humanities course and BIOL 120/121. Electives chosen from agriculture or other supporting departments, when approved by an assigned advisor, complete the total of 64 semester hours required for this degree.

**Not required for Horticulture.*

Teacher Certification in Agricultural Education

Numerous job opportunities are available for students who have completed certification for teaching agriculture education in public schools at the middle or secondary level. A 2.5 minimum grade point average in agriculture, general education and professional education is required for admission to teacher education. Students desiring to become certified to teach agriculture education in Kentucky public schools are required to have a minimum of 50 hours in agriculture including a minimum of 6 hours of plant/horticulture science, 6 hours of animal science, 6 hours of agricultural mechanics (AGMC 170/171 and 371/372), 6 hours of agricultural economics (AGECE 360 and 361), and 6 hours of soil sciences. Computer science requirement may be fulfilled by completing AGECE 365, CS 145 or CIS 141. Professional education courses required are AGED 250(EDU 250), PSY 310, EXED 330, AGRI 398E, AGED 470, AGED 471, EDU 489 and SEC 490. Student must complete 250, 310, 330, 398E before the fall semester of the senior year. AGED 470 and 471 are taught the fall semester. SEC 489 and 490 are completed the student teaching semester, usually the spring semester. Teachers hired in other states may be required to have other professional education course work according to local regulations.

Department of Architectural and Manufacturing Sciences

Baccalaureate Degree Programs

The Architectural and Manufacturing Sciences (AMS) Department offers five distinct degree programs. Four of these programs provide students with both a technical background and fundamental managerial skills to enable the graduate to move into a leadership position in their chosen profession. The four managerial programs follow: Advanced Manufacturing, Architectural Sciences, Construction Management, and Technology Management. The fifth degree program is Industrial (Vocational, Career, and Technical) Education. This program is designed to prepare educators for vocational education programs or for technology education in the middle and high school grades. Refer to the department web site <http://www.wku.edu/ams> for additional information regarding the curricula for each program of study.

Mission Statement: A&M Sciences: the best at preparing graduates for positions of leadership in industry, business, and education since 1920.

AMS Website: See the departmental web site <http://www.wku.edu/ams> for exciting career opportunities in the department of Architectural and Manufacturing Sciences. A semester-by-semester outline of studies is listed for all programs of study on the departmental web site.

Major in Advanced Manufacturing

The major in Advanced Manufacturing (reference number 506) requires 74 hours and leads to a Bachelor of Science degree. Students must choose one of the following concentrations: Food Processing and Technology, Manufacturing and Industrial Distribution, or Quality Systems. This program prepares individuals to apply basic engineering principles and advanced manufacturing technical skills in support of industrial operations. The major includes instruction in optimization theory, human factors, organizational behavior, industrial processes, industrial planning procedures, systems integration, quality, and project management. Graduates achieve positions of leadership in business and industry while practicing innovation in the global marketplace.

Career Opportunities

Graduates obtain employment in a wide variety of positions. Some job titles of graduates include: systems integrator, industrial engineer, production manager/specialist, new product development engineer, manufacturing engineer, quality manager, quality engineer, production engineer, general manager, plant manager, industrial trainer, project manager, and technology educator.

Program Description

A minor or second major is not required. Course requirements for the major are shown below. Students should consult with an advisor in planning their course schedules and career goals. The program is accredited by ATMAE (the Association of Technology, Management, and Applied Engineering).

Technical Core (19 hours): ACCT 200, AMS 120, 163/205, 271, 328, 398, and 490

Management Core (30 hours): AMS 310, 356, 371, 390, 394, 396, 430, COMM 345, MGT 301, ENG 306 or 307

In addition to the coursework in the technical core and managerial core, students will pick one of the following concentrations.

Food Processing and Technology Concentration (25 hours): AMS 301, 303, 343, 352, 381, 395, 443, 462, and 1 hour of an advisor approved elective. The following courses are required in addition to the courses required for the major: ECON 202, MATH 117 or MATH 118 or higher, CHEM 105/106, BIOL 207/208, SFTY 171; these courses may fulfill general education requirements.

Manufacturing and Industrial Distribution Concentration (25 hours): AMS 217, 227, 342, 343, 370, and 10 hours of advisor approved electives. The following courses are required in addition to the courses required for the major: ECON 202, MATH 117 or MATH 118 or higher, CHEM 116, 106, PHYS 201, SFTY 171; these courses may fulfill general education requirements.

Dr. Terry Leeper, Interim Head

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Professors: B. Askins, G. Mills
Associate Professors: G. Arbuckle,
A. Doggett, N. Downing, D. Jackson,
B. Reaka
Assistant Professors: S. Aly,
A. Khalafallah, J. Houryieh, L. Leach

Quality Systems Concentration (25 hours): AMS 217, 342, 370, 391, 392, 471, and 7 hours of advisor approved electives. The following courses are required in addition to the courses required for the major: ECON 202, MATH 117 or MATH 118 or higher, SFTY 171; these courses may fulfill general education requirements.

Major in Architectural Science

The major in Architectural Science (reference number 518) requires 83 semester hours. Architectural Science is a bridge between design theory and construction practice. Architectural Technologists perform a variety of important functions in many areas of the architectural and building construction fields and are widely recognized by professionals in the construction industry. Graduates find employment as drafters, designers, construction planners, estimators, inspectors, technical sales representatives, and many other exciting areas.

Career Opportunities

Graduates obtain employment in a wide variety of organizations: architectural firms, engineering firms, interior design firms, contractors, design-build construction firms, surveying firms, government agencies, construction product manufacturers, construction material suppliers, inspection and testing firms, specialty consultants, and computer applications consultants.

Program Description

The program in Architectural Science is designed to provide graduates with a practical architectural education combining an understanding of the philosophy of building design with an applied technical knowledge of construction systems and materials. Graduates are prepared with the knowledge and skills to assist in developing drawings and related documentation, constructing architectural models, developing architectural renderings, creating digital images and visualizations, preparing cost estimates and construction planning documentation, and making professional presentations.

Program instruction includes architectural drafting, construction methods and materials, design principles, environmental systems, building systems, building codes, structural principles, project management, sustainability, and professional presentations.

The major in Architectural Science leads to a Bachelor of Science degree. A minor or second major is not required. Course requirements for the major are shown below. Students should consult with an advisor in planning their course schedules and career goals. The program is accredited by ATMAE (the Association of Technology, Management, and Applied Engineering).

The following courses are required for the major: AMS 151, 120, 140, 163, 175, 251, 261, 262, 263, 273, 282, 305, 325, 363, 369, 371, 390, 398, 430, 463, 469, 488, 490, CE 303, 304, ENG 306 or 307, 9 hours of advisor-approved architectural science electives, and 3 hours of advisor-approved management electives. Students are also required to take the following additional courses outside of the major: AMS 180, ECON 202, MATH 117, PHYS 201, and SFTY 171; these courses may fulfill general education requirements.

Major in Construction Management

The major in Construction Management (reference number 533) leads to a Bachelor of Science degree. A minor or second major is not required. The curriculum requires a total of 128 hours: (71 technical specialty hours, 46 hours of general education, plus 11 hours of other requirements). Course requirements for the major are shown below.

Students should consult with an advisor in planning their four-year degree program. A four-year plan of study (semester-by-semester) is outlined below and on the departmental web site www.wku.edu/ams. The program layout is also available in the Departmental Office (ESTB 204).

The following courses are required for the major: AMS 140, 163, 261, 262, 271, 325, 398, 430, 490, CM 227, 250, 337, 346, 363, 400, 426, 462, 463, CE 160, 161, 303, 304, 316, ACCT 200, 201, MGT 301, 311, and 6 hours of advisor-approved construction management electives. Students are also required to take the following additional courses outside of the major: AMS 175, CIS 141, ENG 100, 200, 300, COMM 161, PHIL 321, HIST 119(120), ECON 150, MATH 122, CHEM 106 and 116, PHYS 201, and SFTY 171; these courses may fulfill general education requirements.

Career Opportunities

Graduates from the construction management program have many career options available to them. They may choose to work for construction management firms, general contractors, and specialty contractors serving the commercial, industrial, heavy civil, and residential construction markets. They may choose to become specialists in estimating, scheduling, safety, quality, or field supervision. Typical job titles include project manager, project engineer, office engineer, field engineer, and superintendent along with many others.

Industrial (Vocational, Career, and Technical) Education

The major in Industrial (Vocational, Career, and Technical) Education (reference number 599) leads to a Bachelor of Science degree. Students have the option to follow one of the two concentrations: (1) technology education and (2) industrial education. The program is designed to meet the increasing need for more and better-qualified teachers in the nation's expanding programs of vocational-industrial and technology education.

Requirements for both concentrations (15 hours): PSY 310, AMS 331, 329, 333, and EXED 330

Technology Education Concentration Requirements: AMS 330, LTCY 421, EDU 489, SEC 490, and 48 hours of technical electives

Industrial Education Concentration Requirements: AMS 330, 334, 435, and 48 hours of technical electives

Curriculum Requirements

Industrial Education Components

Credits are selected from the specialization components of the curriculum standards for the High School Certificate Degree Program with an area of concentration in Industrial Education-Preparation and Orientation Levels (Technology Education).

Eighteen hours of credit may be earned by passing the written and performance components of the competency exam administered by the National Occupational Competency Testing Institute. The competency exam must be in the teaching field (preparation only).

Work Experience: four years of successful and appropriate occupational experience in the teaching area (two of the four years must have been within the last five years). Total 48 hours.

The following courses are required to complete the professional education component (preparation): PSY 310, AMS 329, 330, 331, 333, 334, 435, and EXED 330. The following courses are required to complete the professional education component: PSY 310, AMS 329, 330, 331, 333, 334, 435, and EXED 330. (AMS 435 must be completed for 8 hours of credit. Four years of teaching experience may substitute for 4 hours of student teaching).

Major in Technology Management

Technology is defined as any tool or operating system designed to improve the efficiency, quality, and competitiveness of an organization. Technology Management (reference number 575) at Western Kentucky University is a 2+2 program designed specifically for students who currently hold a certificate or associates degree from a technical school, two-year college or four-year institution. The Technology Management program is a capstone program that provides a two-year management emphasis for those working toward a supervisory position in industry. Graduates are empowered to obtain a position of leadership in business, industry or workforce development in support of innovation and global competitiveness. The program is available completely on-line or by face-to-face instruction on campus.

Transfer students with an associate degree who major in technology management receive a 15-hour waiver of the overall upper-division hour requirement.

Career Opportunities

Graduates obtain employment in a wide variety of positions, some job titles of graduates include: systems integrator, industrial engineer, production manager/specialist, manufacturing engineer, maintenance specialist, quality manager, quality engineer, production engineer, general manager, plant manager, industrial trainer, project manager, systems analyst, shift supervisor, and technology educator.

Program Description

Western Kentucky University provides upper-division hours both in the major and in general education toward the completion of the degree. Students take 39 hours of major courses through the Architectural and Manufacturing Sciences Department that includes 12 hours of upper-division electives approved by the advisor. Majors then take AMS, general education or elective courses to fulfill university requirements regarding the following:

- 36 hours minimum in WKU courses
- 42 hours minimum upper-division courses
- 120 hours minimum for graduation
- General education categorical requirements
- MATH 116 or equivalent

Degree Requirements for Technology Management Major (54 hours)

- 24 semester hours of advisor approved courses transferred from a technical school, college or university – 100/200 level and
- 39 semester hours – Architectural and Manufacturing Sciences Department for a total of 54 hours in the major. Major courses include: AMS 271, 310, 356, 371, 390, 394, 430, 490, ENG 307, and twelve hours of advisor-approved technical upper-division electives.

General Education

- 30/31 semester hours transferred from a community college or university – 100/200 level courses and/or KCTCS (Kentucky Community and Technical College System)
- 15 semester hours from WKU, extended campus, KCVU or by correspondence – includes 15 hours of upper-division credit – 300/400

Students should consult with an advisor in planning their four-year degree program in Technology Management.

Minor in Construction Management

The minor in construction management (reference number 343) requires a minimum of 21 hours, only 9 of which can be duplicated in the student's major program of study. The student who elects a minor in construction management must complete the following courses: AMS 261, 262, CE 303/304, CM 363 or CE 360/361, and CM 462. Remaining hours shall be selected in consultation with the minor advisor.

Minor in Industrial Sciences

The minor in industrial sciences (reference number 395) requires a minimum of 18 semester hours (half of which must be upper division 300 or 400 level). The purpose of the minor in industrial sciences is to provide students with technical preparation that will support their career goals in their current major. Each program of study will include a balance of basic and advanced courses. Programs must be planned in advance with the department head.

Associate Degree Programs

Architectural and Manufacturing Sciences offers four associate degree programs. Two of the associate degrees are linked to the four-year degree programs in Architectural Sciences and Advanced Manufacturing. The third is linked to the teacher education program of study. The associate of science degrees in Architectural Drafting Technology (reference number 207) and the associate of science in Manufacturing Technology (reference number 257) are designed to be 2+2 programs with the four-year degrees in Architectural Sciences and Advanced Manufacturing. This gives students the ability to complete the two-year degree with the option of completing a four-year degree with little or no loss of credit. For more information regarding the associate degree programs in Architectural Drafting Technology and Manufacturing Technology, visit the departmental website or obtain advisement sheets in the main office of the department (ESTB 204).

Associate of Science Degree in Vocational/Industrial and Technical Teacher Education

The Vocational/Industrial and Technical Teacher Education associate degree (reference number 296) is designed to meet the increasing need for more qualified teachers in the nation's expanding programs of vocational-industrial technical education.

Curriculum Requirements

Technical Education Components

Specialization credits are selected from the specialization components of the curriculum standards for the Provisional High School Certificate Degree Program with an area of concentration in Industrial Education-Preparation Level (advisor's approval required).

Eighteen hours of credit may be earned by passing the written and performance components of the competency exam administered by the National Occupational Competency Testing Institute. The competency exam must be in the teaching field.

Work Experience: four years of successful and appropriate occupational experience in the teaching area (two of the four years must have been within the last five years). Total 24 semester hours.

The following courses are required to fulfill the professional education component: PSY 310, AMS 329, 330, 331, 333, 334, and 435.

Associate of Science Degree in Water Resource Management

The associate degree in water resource management (reference number 298) requires a minimum of 60 hours. The program is designed to meet the increasing need for individuals in the fields of water and wastewater treatment to understand the broad concepts of the industry and the technical tasks required.

The following 15 hours of general education courses are required: ENGL 100C, a category B elective, PS 110C, a category C elective, and MATH 116C. The following 21 hours of core courses are required: BIOL 113/C, 207/C, CHEM 101/C, ENV 280, MATH 117/C, PHYS 101, GEOG 100/C. In addition, students must take 24 hours in a specific concentration.

Water Technology: WTTI 200C, 210C, 212C, 220C, 222C, 226C, 230C, 291C.

Wastewater Technology: WTTI 200C, 211C, 212C, 221C, 222C, 226C, 231C, 291C.

Water Utilities Management: WTTI 200C, UM 101C, 205, 215C, 225C, 235C, 245C, 290C.

Certificate in Drinking Water Operations

The certificate in drinking water operations (reference number 1715) requires 24 semester hours. This program is intended for students wishing to pursue a career in drinking water operations without completing an associate degree. The courses needed to fulfill the requirements for this certificate are WTTI 200, 210, 220, 222, 226, 230, and AMS 367.

Department of Biology

Students interested in biology are presented with a variety of dynamic educational opportunities. These opportunities, involving diverse biological sub-disciplines from molecules to ecosystems, challenge the student of biology in one of the most exciting and eras in human history. The Department of Biology is dedicated to producing well-informed, scientifically literate graduates capable of applying the knowledge and skills acquired to ensure professional success and lifelong learning.

Undergraduate students collaborate with biology faculty on an array of interesting research topics. By applying what students have learned in the classroom to research projects, students can more smoothly make the transition to professional and graduate programs and the work force. Our novel Biotechnology Certification program is designed to provide students with technical skills for research. New state-of-the-art classrooms, research laboratories, and the Potter-Nicely Outdoor Education Center and Upper Green River Biological Preserve provide outstanding settings for student research. The Biology Department is also proud to house the Biotechnology Center, Center for Biodiversity Studies, and Bioinformatics and Information Science Center. The centers are integral components of the Applied Research and Technology Program, a state-funded program of distinction.

When planning a program of study in the Department of Biology each student must be aware of the University's academic requirements and regulations contained in this catalog in the section, "Academic Information." Specific attention should be given to the subsections entitled (a) Academic Programs, (b) General Education Requirements, and (c) Academic Requirements and Regulations. Students should be aware that some academic programs may require additional scholastic requirements and standards not specified in the catalog. To obtain a copy of these requirements, students should contact the department head. We offer five options for a B.S. degree: A Biology major without a minor (reference number 525), a Biology major with a minor (reference number 617), an Investigative Biotechnology major (reference number 714), a Biochemistry major (reference number 519), and a Medical Technology major (reference number 582). Each is described below along with our minor in Biology, minor in Investigative Biotechnology, Teaching Certifications, and other Special Programs, including our 5-year B.S./M.S. combination program in Biology.

Dr. Bruce A. Schulte, Head

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Website: <http://www.wku.edu/biology>

Professors: C. Davis, K. Doerner,
B. Ferrell, S. Grubbs, S. Jacobshagen,
D. McElroy, A. Meier, T. Philips,
C. Rinehart, S. Sahi, B. Schulte,
M. Stokes

Associate Professors: L. Alice,
K. Crawford, S. Huskey, R. King,
P. Lienesch, N. Rice, M. Smith,
R. Wyatt

Assistant Professors: M. Collyer, C. Dick,
C. Emani, J. Johnson, A. Srivastava,

Instructors: P. do Amaral, W. Mason,
H. Mahmood, K. McDaniel, N. Sharma

**Major in Biology
(without a minor)**

This option for a major in biology (reference number 525) requires a minimum of 48 hours in biology with 24 hours at the 300 or higher level. No minor is required. Several areas of emphasis are available including ecology and evolutionary biology, molecular and cellular biology, plant biology, animal biology, and microbiology. All students are required to complete BIOL 120-121 and BIOL 122-123, and at least one course from each of the following three groups:

- (A) BIOL 222-223 or BIOL 224-225 or BIOL 226-227
- (B) BIOL 319 & 322 or BIOL 327
- (C) BIOL 315 or BIOL 430.

Students, with the aid of their advisor, select additional 300- and 400-level courses to focus their studies on specific areas within biology. Because an understanding of the principles of mathematics, physics, and chemistry is essential to the study of biology, majors are required to complete supporting courses as follow:

1. MATH 116 & 117 or MATH 118 or higher
2. PHYS 231-232 or PHYS 255-256
3. CHEM 120-121, and
4. two courses from the following list: AGRO 350 and AGRO 452 or AGRO 454 or AGRO 455/456 or AGRO 457/458. BIOL 283, CHEM 222-223, CHEM 314 or CHEM 340-341, CHEM 330, CIS 343, CIS 226 or CS 226 or CS 146, GEOG 316, GEOG 317, GEOG 328, GEOG 416, GEOG 417, MATH 136, MATH 137, MATH 142, MATH 305, MATH 307, PHYS 332-233 or PHYS 265-266; SOCL 302.
5. Students may count up to 6 credit hours of a combination of BIOL 369, 389, and 399 and up to 6 credit hours of BIOL 485 toward this major.

Major in Biology (with minor)

This option for a major in biology (reference number 617) requires a minimum of 36 semester hours in biology with 18 hours at the 300 or higher level plus the requirements of a minor area. The major-minor combination must be at least 54 semester hours. All students are required to complete BIOL 120-121 and BIOL 122-123, and at least one course from each of the following three groups:

- (A) BIOL 222-223 or BIOL 224-225 or BIOL 226-227
- (B) BIOL 319 & 322 or BIOL 327
- (C) BIOL 315 or BIOL 430.

Students with the aid of their advisor, select additional 300- and 400-level courses to focus their studies on specific areas within biology. Because an understanding of the principles of mathematics, physics, and chemistry is essential to the study of biology, majors are required to complete supporting courses as follows:

1. MATH 116 & 117 or MATH 118 or higher
2. PHYS 231-232 or PHYS 255-256
3. CHEM 120-121, and
4. two courses from the following list: AGRO 350 and AGRO 452 or AGRO 454 or AGRO 455/456 or AGRO 457/458. BIOL 283, CHEM 222-223, CHEM 314 or CHEM 340-341, CHEM 330, CIS 343, CIS 226 or CS 226 or CS 146, GEOG 316, GEOG 317, GEOG 328, GEOG 416, GEOG 417, MATH 136, MATH 137, MATH 142, MATH 305, MATH 307, PHYS 332-233 or PHYS 265-266, SOCL 302.
5. Students may count up to 3 credit hours of a combination of BIOL 369, 389, and 399 and up to 4 credit hours of BIOL 485 toward this major.

Suggested Program of Study			
Biology Major - 525 and 617			
Fall Semester Freshman Year	Hrs.	Spring Semester Freshman Year	Hrs.
BIOL 120-121 or BIOL 122-123	4	BIOL 122-123 or BIOL 120-121	4
MATH 118 or 142	5	CHEM 120-121	5
ENG 100	3	General Education Elective	3
BIOL 175 or Gen. Ed. Elective	2-3	General Education Elective	3
Total Hours	14-15	Total Hours	15
Fall Semester Sophomore Year	Hrs.	Spring Semester Sophomore Year	Hrs.
BIOL 222-223 or BIOL 224-225 or BIOL 226-227	4	BIOL 319 & 322 or BIOL 327	4
PHYS 231-232	4	Biology supporting course	3,5
Biology supporting course	3-5	General Ed. or Bio. Elective	3-4.5
General Education Elective	3	General Education Elective	3
Total Hours	14-16	Total Hours	13-16.5

Major in Investigative Biotechnology

This major (reference number 714) meets the needs of students interested in the rapidly growing field of genetic engineering, molecular genetics and biotechnology. Biotechnology is expanding in many directions including the production of new pharmaceutical drugs, industrial chemicals, food products, energy sources, pollution-control products and, more recently, methods employed in agriculture. In addition to receiving training for industrial employment, graduates of this program will also have the broad liberal arts training necessary to enter graduate programs and the contemporary skills to be competitive for top positions in industry or academia. The major requires a minimum of 48 semester hours in biology with 24 hours at the 300 or higher level. No minor is required. The required core courses are: BIOL 150, 151, 199, 275, 312, 327, 350, 369 or 399, 411, 446, and 495. Required supporting courses are: MATH 136 or BIOL 283, CHEM 120-121, 222-223, 314 or 340-341/342-343, and PHYS 231-232, 332-233. Any course in the biology curriculum applicable to the biology major may be used as an elective for the Investigative Biotechnology major in consultation with the student's advisor. Interested students should contact a faculty member affiliated with the Biotechnology Center.

Suggested Program of Study			
Department of Biology Investigative Biotechnology Major 714			
Fall Semester Freshman Year	Hrs.	Spring Semester Freshman Year	Hrs.
BIOL 150	5	BIOL 151	5
CHEM 120-121	5	BIOL 199	1
ENG 100	3	MATH 136	4
General Ed. Elective	3	CHEM 222-223	5
Total Hours	16	Total Hours	15
Fall Semester Sophomore Year	Hrs.	Spring Semester Sophomore Year	Hrs.
BIOL 283 or BIOL 327	4	BIOL 350	3
PHYS 231-232	4	BIOL 312	4
CHEM 314 or CHEM 340-341	5	CHEM 342-343 or BIOL 275	5
General Ed. Elective	3	PHYS 332-233	4
Total Hours	16	Total Hours	16

Major in Biochemistry

(See Biochemistry, reference number 519.) Interested students should contact Dr. S. Jacobshagen, Department of Biology.

Major in Medical Technology

(See Medical Technology, reference number 582) Interested students should contact Dr. K. McDaniel, Department of Biology.

Minor in Biology

The minor in biology (reference number 326) requires a minimum of 24 semester hours in biology with 12 hours at the 300 or higher level. The required courses are BIOL 120-121 and BIOL 122-123. Students, with the aid of their advisor, select additional biology courses to complete the minor. Students may count up to 3 credit hours of a combination of BIOL 369 and 399 and up to 4 credit hours of BIOL 485 toward this minor.

Minor in Investigative Biotechnology

The minor in Investigative Biotechnology (reference number 399) requires a minimum of 24 semester hours in biology with 12 hours at the 300 or higher level. The required courses are BIOL 150, 151, and 350. Students, with the aid of their advisors, select additional biology courses to complete the minor.

Secondary Teaching Certification in Biology

Students who wish to be certified to teach high school biology must complete both the major in Biology (reference number 525 or 617) and the major in Science and Mathematics Education (SMED, reference number 774), offered in the School of Teacher Education. Interested students should contact the SKyTeach Office, Thompson Complex Central Wing 105, (270) 745-3900.

Middle Grades Science Certification

Students who wish to teach middle school science must complete both the major in Middle School Science Education (MSSE, reference number 734), offered in the Department of Physics, and the major in Science and Mathematics Education (SMED, reference number 774), offered in the School of Teacher Education. Interested students should contact the SKyTeach Office Thompson Complex Central Wing 105, (270) 745-3900.

Other Department Programs

Several other biologically oriented, specialized programs are available such as biophysics, environmental studies, environmental science, as well as several pre-professional programs. Specific details of these programs are listed under Pre-Professional and Interdisciplinary Programs.

A Five-Year Plan

For highly motivated students, especially those planning to pursue graduate study, the department offers a five-year program leading to both B.S. and M.S. degrees in biology. Typically, students will also participate in the University Honors Program as undergraduates. Completion of the M.S. portion of the program requires enrollment in summer terms during the fourth and fifth years. A key component of this program is early and sustained involvement in undergraduate research, beginning in the sophomore year. As such, interested students must work closely with their undergraduate advisor early in their freshman year to design their five-year plan and identify a faculty mentor and area of research.

Graduate Degree Programs

Students interested in graduate study in biology should consult the University's Graduate Studies Catalog for detailed information concerning the various programs available. The department offers: (1) M.S. degree with research thesis for students interested in a career in biology or in preparation for Ph.D. studies; (2) M.S. degree without research thesis (an online option is available); (3) M.A. degree in Education (major or minor in biology) which places less emphasis on specialization and research and more on breadth in biology.

Admission to graduate study in biology requires a 3.0 on a 4.0 scale overall grade point average with superior performance in biology and related sciences, and an appropriate GRE score or an acceptable equivalent. The prospective graduate student is expected to have completed an undergraduate course program equivalent to that required for a standard major in biology at Western Kentucky University.

Department of Chemistry

Chemistry is often described as "The Central Science" in today's technology-driven world. Chemistry plays an important role in the research, development and quality assurance of products and materials ranging from pharmaceuticals and polymers to ceramics and nanocomposites. A knowledge and understanding of fundamental chemical concepts are crucial to success in professions such as medicine, pharmacy, veterinary medicine, forensic science, environmental science, engineering, medical technology, physical therapy, nursing, patent and environmental law and science education.

In order to best serve such a diverse audience, the chemistry curriculum at Western Kentucky University offers an integrated series of lecture and laboratory courses. Our courses provide students with grounding in theoretical models balanced with real-life applications and hands-on laboratory experiences. This allows students to achieve an understanding of chemical and physical phenomena at the molecular level and to develop the critical thinking skills necessary for chemical problem solving. In addition to course work, the Department of Chemistry provides our undergraduates a wide variety of research opportunities from biochemistry to materials science. Research encourages students to continue to build their laboratory skills and scientific knowledge while working one-on-one with a faculty member. Undergraduate research students often present their research at both regional and national professional meetings. Recently, students have presented their research at meetings located in Orlando and San Francisco. The combination of lecture, laboratory and one-on-one faculty interaction allows students to develop the skills necessary to be successful in their chosen profession.

As part of the educational experience, students are routinely trained in the operation of state-of-the-art instrumentation in the academic and research laboratories. The Department has an extensive holding of instrumentation which includes: atomic spectrometers, calorimeters, a capillary electrophoresis system, electrochemical analyzers, elemental analyzers, gas chromatographs, FT-infrared spectrometers, ion chromatographs, mass spectrometers, spectrofluorophotometers, supercritical fluid extractors, UV-visible

Dr. Cathleen Webb, Department Head

E-mail: Cathleen.Webb@wku.edu

Thompson Complex, Central Wing

Office 444, Phone: (270) 745-3457 Fax: (270) 745-5361

Website: www.wku.edu/chemistry

Professors: L. Byrd, E. Conte, D. Dahl, W. Pan, L. Pesterfield

Associate Professors: S. Burris, C. Webb, K. Williams

Assistant Professors: R. Dakshinamurthy, J. Maddox,
M. Nee, H. Rathnayake, C. Snyder, B. Yan, R. Zhang

Instructor: A. Brooks

Professors Emeriti: D. Hartman, C. Henrickson, N. Hunter,
J. Reasoner, J. Riley, L. Shank, D. Slocum, C. Wilkins

spectrophotometers, a Nd-YAG laser system and a 500 MHz nuclear magnetic resonance spectrometer, and a newly acquired 90 MHz fixed magnet NMR.

General education requirements for students majoring outside the sciences are satisfied by CHEM 101 or 109 where only one semester of chemistry is needed and by the sequences 105-106, 107-108 or 120-121, 222-223 where two semesters of chemistry are desired. All students seeking entrance into CHEM 120 must take the Chemistry Placement Exam. Please call the WKU Testing Center at 270-745-3159 to make an appointment. CHEM 102 (laboratory to accompany CHEM 101) is not necessary to satisfy general education requirements but is often desired by students taking Chemistry 101.

Biochemistry courses (CHEM 446, 447, 462, and 467) may be taken as electives toward a major or minor in chemistry. CHEM 446 is required for the major certified by the American Chemical Society. Biochemistry is also strongly recommended for pre-medicine and pre-dentistry students, and for biology majors desiring a second major in chemistry.

Chemistry as the major or minor field is available under both the regular and teacher certification programs.

When planning a program of study in this department, each student should be aware of the University's academic requirements and regulations contained in this catalog in the chapter, "Academic Information." Specific attention should be given to the subsections in the chapter entitled (a) Academic Programs, (b) General Education Requirements, and (c) Academic Requirements and Regulations. Students should be aware that some academic programs may require additional scholastic regulations and standards not specified in the catalog. To obtain a copy of these regulations, students should contact the department head.

Major in Chemistry

The major in chemistry (reference number 623) requires a minimum of 30 semester hours and leads to the Bachelor of Science degree. A second major or minor is also required. The department offers three programs of study that lead to a Bachelor of Science degree in chemistry. Prior to selection of a program of study, a student must consult with a chemistry advisor in order to determine the most appropriate option.

Option I – ACS Certified Chemistry Major

WKU is on the approved list of the Committee on Professional Training of the American Chemical Society. For certification by this committee of the completion of minimum standards (48 hours of chemistry) for the Bachelor of Science degree in chemistry, the required courses are as follows, with the sequence recommended.

Qualified students may omit MATH 118 and start with MATH 136. Students whose high school preparation in mathematics makes them ineligible for MATH 118 should consult their academic advisor for the proper first course in mathematics. It is recommended that students in this program take MATH 307 and 331 in addition to the above math requirements. MATH 116/117 will substitute for MATH 118.

Suggested Program of Study			
Chemistry major: graduate and professional with ACS certification --Option I			
Freshman - Fall CHEM 120/121 MATH 118	Hrs. 4/1 5	Freshman - Spring CHEM 222/223 MATH 136	Hrs. 3/2 4
Sophomore - Fall CHEM 340/341 MATH 137 PHYS 255/256	Hrs. 3/2 4 4/1	Sophomore - Spring CHEM 342/343 CHEM 330* PHYS 265/266	Hrs. 3/2 5 4/1
Junior - Fall CHEM 450/451 CHEM 446 CHEM 398	Hrs. 3/2 3 1	Junior - Spring CHEM 452/453 CHEM 399	Hrs. 3/2 1
Senior - Fall CHEM 435 CHEM 399	Hrs. 3 1	Senior - Spring CHEM 420 CHEM 476 (highly recommended)	Hrs. 3 2
* Sophomores and Juniors are given preference for registration in CHEM 330.			
It is important that physical chemistry, CHEM 450, 451, 452 and 453, be taken in the junior year since CHEM 452 is a prerequisite or corequisite for most courses numbered above 400.			

Option II

Majors, who plan on attending professional or graduate school but who do not wish the full American Chemical Society program, should take the following courses:

Suggested Program of Study			
Chemistry major: graduate and professional w/o ACS certification Option II			
Freshman - Fall CHEM 120/121 MATH 118	Hrs. 4/1 5	Freshman - Spring CHEM 222/223 MATH 136	Hrs. 3/2 4.5
Sophomore - Fall CHEM 340/341 MATH 137 PHYS 255/256	Hrs. 3/2 4.5 4/1	Sophomore - Spring CHEM 342/343 CHEM 330* PHYS 265/266	Hrs. 3/2 5 4/1
Junior - Fall CHEM 450/451 CHEM 320 or 446	Hrs. 3/2 3	Junior - Spring CHEM 452/453	Hrs. 3/2
Senior Year CHEM 398, 399, 420, 435, and 476 are highly recommended.			
* Sophomores and Juniors are given preference for registration in CHEM 330.			

Option III

Pre-health professional students majoring in chemistry and students who desire a double major are advised to include the following courses:

Suggested Program of Study			
Chemistry major: ideal for double major and pre-health professional Option III Students (see advisor regarding other science requirements)			
Freshman - Fall CHEM 120/121 MATH 118	Hrs. 4/1 5	Freshman - Spring CHEM 222/223 MATH 136	Hrs. 3/2 4
Sophomore - Fall CHEM 340/341 CHEM 330* PHYS 231/232	Hrs. 3/2 5 3/1	Sophomore - Spring CHEM 342/343 PHYS 332/233	Hrs. 3/2 3/1
Junior - Fall CHEM 446 or 320	Hrs. 3	Junior - Spring CHEM 412	Hrs. 5
* Sophomores and Juniors are given preference for registration in CHEM 330.			

At least one semester of organic chemistry, one semester of inorganic chemistry or biochemistry, and one semester of physical chemistry are required, with additional courses in chemistry numbered above 300 to make a total of 30 semester hours. MATH 136 is only required for Option I (ACS Certified Major). MATH 116/117 will substitute for MATH 118.

For a chemistry major under the teacher certification curriculum, students should take:

Freshman Year:

- Fall – CHEM 120-121 and MATH 118
- Spring – CHEM 222-223 and MATH 136.

Sophomore Year:

- Fall – CHEM 330, PHYS 231-232 and GEOL 111/113
- Spring – CHEM 314 and PHYS 332/233.

Junior Year:

- Fall – CHEM 320, 446-447 and 399
- Spring - CHEM 412 and CHEM 399. Education courses required for certification are: EDU 250, 351, 352, 453, 479, 489, 490 and PSY 310.

Other upper division Chemistry courses can be substituted for CHEM 399 with the permission of the Department Head.

Major in Biochemistry

A BS degree in biochemistry (reference number 519) requires a minimum of 60 credit hours and consists of core chemistry and biology courses with electives selected from chemistry, biology, agriculture and physics. For more information, see "Biochemistry" under Pre-Professional and Interdisciplinary programs.

Minor in Chemistry

The minor in chemistry (reference number 335) requires a minimum of 18/21 hours. For a minor a student must have CHEM 120-121, 222-223, 330 and courses numbered above 300 to make a total of at least 18 semester hours. Note that at least nine semester hours must be earned in courses numbered 300 and above.

For a minor under the teacher certification curriculum, a student must have CHEM 120-121, 222-223, 330, 314, and 412. An additional 3 credits of upper-division chemistry courses will also complete a second major in chemistry.

Minor in Coal Chemistry

The minor in coal chemistry (reference number 340) requires a minimum of 20-22 hours in chemistry. For a minor a student must have CHEM 120-121, 222-223, 314.

Minor in Environmental Studies

(See Environmental Studies under Pre-professional and Interdisciplinary Programs.)

Minor in Nutritional and Food Chemistry

The minor in nutritional chemistry (reference number 421) will require a minimum of 18 hours, including 12 hours of required courses and at least 6 hours of elective courses to be selected in consultation with an advisor. The required courses are CHEM 105, 106, 107, 108, and 304. Students much choose at least 6 hours from the following electives: CHEM 299, 314; FACS 111, 261; AMS 301, 303, 352, 381, 443, 462; BIOL 207, 208; AGECE 468. At least half of the credits must be at the upper-division level.

Graduate Degree Programs

Graduate programs and courses leading to the Master of Science and Master of Arts in Education with a major in chemistry are available in the Department of Chemistry. Each year a number of graduate teaching assistantships are available for qualified graduate students. For additional information see the Graduate Studies Catalog or contact the Chair of the Chemistry Graduate Programs.

A cooperative graduate program leading to the doctor of philosophy is administered by the Department of Chemistry at Western Kentucky University and the Department of Chemistry at the University of Louisville. Interested students may obtain complete information about the program from Dr. Cathleen Webb, Head, Department of Chemistry, Western Kentucky University, or from the Chair of the Department of Chemistry at the University of Louisville, Louisville, Kentucky.

Department of Engineering

Engineers turn dreams into reality. Engineering is the process of designing solutions to real world problems using mathematical and scientific principles. It merges creative thinking with analytical skills to create systems and processes such as automobiles, buildings, bridges, computers, electrical systems, manufacturing processes, and software. Engineering is a primary difference between our modern world and primitive societies.

The engineering programs at Western Kentucky University are dedicated to teaching the practice of engineering to undergraduate students in a project-based environment. Beginning with the first freshman class and progressing through the last senior class, engineering students at WKU engage in the practice of engineering under the instruction and guidance of degreed, practicing engineers. Engineering at WKU differs from most other institutions because its faculty is dedicated exclusively to undergraduate engineering education and to engaging students in the practice of engineering without the requirement of supervising graduate research. Many studies have shown that the

Dr. Julie Ellis, Head

**Engineering and Biological Sciences Building (EBS)
Office 2101, Phone: (270) 745-2461
Fax: (270) 745-5856
Website: <http://www.wku.edu/engineering/>**

Professors: C. Byrne, M. Dettman, J. Ellis, A. Ernest,
J. Lenoir, K. Schmaltz, S. Wilson
Associate Professors: M. Cambron, W. Campbell,
R. Choate, W. Collett, S. Palmquist
Assistant Professor: R. Gallagher
Professor Emeritus: J. Russell

**Kenneth E. and Irene S. Hall Professor in Civil
Engineering:** W. Campbell
**James L. "Bud" Layne Professor in Mechanical
Engineering:** J. Lenoir
James D. Scott Professorship in Civil Engineering:
M. Dettman

educational methodologies employed by engineering faculty at WKU are not only the most enjoyable and interesting for students; they are also a more effective way to learn engineering.

The Department of Engineering offers Bachelor of Science degrees in the following areas:

- Civil Engineering (reference number 534)
- Electrical Engineering (reference number 537)
- Mechanical Engineering (reference number 543)

The programs in civil engineering and mechanical engineering are offered jointly with the University of Kentucky. The program in electrical engineering is offered jointly with the University of Louisville.

The Department of Engineering offers minors in electrical engineering (reference number 354), land surveying (reference number 405), and floodplain management (reference number 361), as well as a certificate in land surveying (reference number 1700).

Department Mission

The mission of the Department of Engineering is to produce, as its graduates, competent engineering practitioners. An engineering practitioner is one who has a foundation of basic science, mathematics, and engineering knowledge, combined with practical knowledge and experience in applying existing technology to contemporary problems. Realization of the departmental mission requires that the design of courses and curricula and the activities of the faculty create opportunities for students to understand and gain competence as engineering practitioners. In addition to its primary mission, the department adds value to the university and the community through the activities of its students and faculty.

Engineering projects, developed and directed by faculty, in the various disciplines of the department create an important avenue through which the technical capability of the community is expanded. Faculty and student service on boards and to agencies and other entities provides valuable enrichment to the community.

To fulfill the departmental missions, the department has the following characteristics:

- Program curricula establish an understanding of fundamental engineering concepts. The curricula provide an opportunity for students to obtain a sufficient depth of fundamental knowledge to support lifelong learning in the field of study.
- Programs are baccalaureate-driven. The primary purpose is to prepare undergraduates for entry-level positions upon graduation. Preparation for advanced study is also achieved in each program.
- Programs are regionally relevant. While prepared to be competitive in any market, graduates will be well prepared to begin productive careers as practitioners in regional industries.
- Program curricula are project-based. Students have sufficient opportunity to engage in project activities to support development of a clear understanding of engineering practice. The roles of students – as learners, as observers, as assistants, and as practitioners – are supported by project activities that clearly demonstrate the practice of engineering. Projects that provide opportunity to accomplish design, development, and implementation are available.
- Faculty of the department are practitioners. Scholarly activities of the faculty include engineering practice and are conducted in the context of the departmental programs and our students. Documentation of faculty productivity is produced in the manner and form expected by the university of all faculty.

Details of the curriculum and course information can be found at www.wku.edu/engineering or by contacting the Department of Engineering.

Major in Civil Engineering

Program Coordinator: S. Palmquist

Civil engineers design a better world in which to live. They design, build, and maintain our nation's infrastructure. Some of the things that civil engineers design include: roads and bridges; buildings and foundations; water supply and waste-water facilities; storm water management systems; and environmental protection facilities.

The civil engineering program at WKU focuses on construction, geotechnical engineering, construction materials, structures, surveying, and hydrology.

The major in civil engineering (reference number 534) leads to a Bachelor of Science degree. This degree is jointly offered by Western Kentucky University and the University of Kentucky for students in residence at WKU.

The curriculum requires a minimum of 65 technical specialty hours, completion of general education hours, and additional hours for math and science requirements. Students in the joint civil engineering program are required to obtain 16 credit hours in the major from University of Kentucky (UK) faculty members. Students completing this requirement take the following courses: ENGR 175 or UE 175, CE 176/ME 176 or EE 101, EM 221, 302, 313, CE 341, 373, 331 or 332, 351 or 352, 483, 490, and 491. CE 490 and 491 may be taken more than once provided the topic is different. Students are admitted as a pre-major in civil engineering. To transition from pre-major to major and to graduate with a degree in civil engineering, students must complete each of the following courses and labs with a grade of “C” or better: CE 176, AMS 163, ENG 100, CE 160 and 161, EM 221 or 222, COMM 145 or 161, MATH 136, 137, PHYS 255 and 256, and CHEM 120 and 121. Students must also complete the following courses with a grade of “C” or better: all civil engineering courses; all technical electives; EM 221 or 222; and EM 302 or 303. However, one “D” in a single CE 400-level senior course is permitted. In addition, each student is required to have a 2-course sequence in four (4) different civil engineering areas. The curriculum already includes a 2-course sequence in structures, geotechnical engineering, and construction. Therefore, each student must select one of the technical electives to cover an additional area such as surveying, materials, environmental engineering, hydrology, or transportation. The structures elective may be completed by taking CE 384 or 482 or 483. Students may not receive credit for both CE 482 or 483 and 383, or for CE 482 or 483 and 384. For detailed information on the civil engineering program, please see the “Civil Engineering Handbook” and/or contact your advisor.

Suggested Program of Study			
Department of Engineering 534 Civil Engineering			
Freshman: Fall ENGR 175 or UE 175	Hrs. 2 or 1	Freshman: Spring CE 160 CE 161	Hrs. 3 1
AMS 163	3	MATH 137	4
MATH 136	4	PHYS 255	4
GEOL 111	3	PHYS 256	1
GEOL 113	1	COMM 161 or 145	3
Category E	3	ENG 100	3
CE 176	1		
Sophomore: Fall EM 221 or EM 222	Hrs. 3	Sophomore: Spring EM 302 or EM 303	Hrs. 3
CE 303	3	CE 310	1
CE 304	1	MATH 331	3
MATH 237	4	PHYS 265	4
CHEM 120	4	PHYS 266	1
CHEM 121	1	ENG 200	3
Category F	1	Category A-II	3
Junior: Fall CE 382 or CE 373	Hrs. 3	Junior: Spring CE 316	Hrs. 3
CE 410	3	CE 331 or CE 332	3
CE 411	1	CE 412	3
CE 370 /371	2/1	ENG 300	3
CE 341 or CE 342	4	CE 384	3
STAT 301	3	Technical Elective	3
Category F	1		
Senior: Fall CE 400	Hrs. 1	Senior: Spring CE 461	Hrs. 3
CE 351 or CE 352	3	CE 498	3
Technical Elective	3	Technical Elective	3
ECON 202	3	Category B-II	3
Category B-II	3	Category C	3
HIST 119 or 120	3		
Total Hours: 136			
<i>(A-F) denotes General Education Category</i>			

Civil Engineering Program Mission

The mission of the civil engineering program is to prepare students for professional engineering and management positions in all phases of civil engineering projects.

The program provides a broad educational background with a foundation in basic engineering and business principles. These basic skills are complemented by advanced topics in engineering design, management, finance, computer applications, and real world civil engineering experiences throughout the baccalaureate degree program.

The civil engineering program fulfills the overall mission of the Department of Engineering and also meets the following goals:

- Understanding of fundamental engineering concepts that nurture problem solving abilities.
- Knowledge of basic civil engineering skills to prepare graduates for immediate productivity upon graduation.
- A background in management skills as they relate to working with financial matters as well as with people from diverse backgrounds.
- The ability to communicate ideas, processes, and designs effectively.

The teaching philosophy of this program focuses on project-based learning. This is achieved by placing competent, practicing engineers in the classroom as professors, engaging students in the practice of civil engineering through

hands-on class projects, and involving students in faculty consulting and applied research activities. Real engineering projects often serve as class projects. Project sites and professional engineering and construction management firm offices often serve as classrooms.

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Objective 1: The graduates of the civil engineering program are technically competent. They will possess a broad knowledge of the principles and fundamentals of civil engineering and their application, and thus be able to: successfully practice as professional civil engineers; pursue graduate or professional degrees; or engage in other professional careers that involve the application of the engineering method.

Objective 2: The graduates of the civil engineering program are effective team members. They will function effectively in multicultural and multidisciplinary groups in their practice of the civil engineering. They will effectively participate in the management of projects and the business of which they are a part.

Objective 3: The graduates of the civil engineering program are professional. They will perform all of their duties professionally and ethically. They will understand that what they do is a part of a larger society and will understand their part within that society. They will engage in life-long learning to continually provide themselves with the necessary skills, certifications, and licenses to effectively perform their professional duties, even if their career takes them beyond engineering and into another profession.

Minor in Floodplain Management

Minor Coordinator: *W. Campbell*

This minor has been coordinated with the Geography and Geology Department and with the Kentucky Association of Mitigation Managers. The Floodplain Management minor (reference number 361) requires completion of at least 21 semester hours including 13 core hours taken by all students and an additional 8 hours of electives. At least six hours of the minor must be taken from classes not counting toward completion of the major. The minor provides students with basic knowledge and skills needed to implement and administer flood mitigation and recovery programs. Students develop familiarity with federal floodplain management regulations, the National Flood Insurance Program, hydrology, surveying, and tools such as Geographic Information Systems that are critical to administering an aggressive floodplain management program. Completion of the minor requires familiarity with all aspects of floodplain management and with the impacts of floods on individuals, on property, and on regional or national economics. Students successfully completing the program must have passed the Certified Floodplain Manager (CFM) exam. The CFM is a nationally recognized certification and is considered a desirable qualification by many employers. Required courses for the minor are CE 160/161, CE 300, GEOG 318 (required for engineering students, GEOG 317 may be substituted for geography/geology students), and CE 461 or GEOG/GEOL 310. A minimum of 8 semester hours of electives must be selected from GEOG 121, 207, 208, 209, 391, 414, 433, 416, 417, 419, 437 and 438. GEOG/GEOL 420, GEOG 422, 424, 426, 427, 431, 445, 455, 474, 477, GEOL 111, 113, CE 351, CE 380/381, CE 461 and CE 480/481.

For students majoring in civil engineering, a suggested sequence of courses for completion of this minor is: CE 160 and 161, CE 380 and 381, GEOG 121, GEOG 208, CE 300, GEOG 318, and CE 461.

For students majoring in geography or geology, a suggested sequence of courses for completion of this minor is: GEOG 121, GEOG 208, CE 160 and 161, GEOG 318, CE 300, GEOG 310, and GEOG 414.

Minor in Land Surveying

Minor Coordinator: R. Gallagher

The land surveying minor (reference number 405) provides the student with the basic knowledge and skills needed to accomplish land surveying tasks for entry-level employment. These tasks include boundary surveys, topographic mapping, leveling, stakeouts, traversing, field note taking, distance and angle measurements, plus proper techniques and use of surveying equipment (total stations, EDMs, and levels).

The following courses are currently required for the land surveying minor (26 hours): AMS 163, CE 160 and 161, CE 380 and 381, CE 378 and 379, GEOG 316, and GEOG 317 or 318, and GEOG 414.

Certificate in Land Surveying

Undergraduate students majoring in civil engineering or post-graduate students with baccalaureate degrees in civil engineering, mining, or agricultural engineering accredited by the Accreditation Board of Engineering and Technology (ABET) may obtain a Certificate in Land Surveying (reference number 1700) in order to pursue licensure as a professional surveyor in the state of Kentucky by completing the following courses (15 hours): AMS 163, CE 160 and 161, CE 380 and 381, and CE 378 and 379.

Post-graduate students with baccalaureate degrees in majors other than civil engineering, mining or agricultural engineering may obtain a Certificate in Land Surveying in order to pursue licensure as a professional surveyor in the state of Kentucky by completing the same courses as listed for the minor in land surveying (26 hours). See minor in land surveying.

Major in Electrical Engineering

Program Coordinator: M. Cambron

Electrical engineers are experts in dealing with electricity, electromagnetism, and electronics. Electrical engineering touches virtually every aspect of life in the twenty-first century. Our electrical engineering curriculum exposes students to a variety of topics to prepare them for careers as engineers. Electrical engineers are employed in a variety of industries including:

Suggested Program of Study				
Electrical Engineering Curriculum				
Freshman: Fall		Hrs.	Freshman: Spring	Hrs.
ENGR 175 Univ Expr - ENGR		1	EE 180 Digital Circuits	4
EE 101 EE Design I		1	MATH 137 Calculus II	4
MATH 136 Calculus I		4	PHYS 255/256 Physics 1/Lab	5
Science Elective		3	HIST 119 or 120 Western Civ.	3
ENG 100 Composition		3	Category F Elective	1
COMM 161(or 145) Business Spkg.		3	Total Hours	17
Total Hours		15		
Sophomore: Fall		Hrs.	Sophomore: Spring	Hrs.
EE 200 EE Design II		1	EE 211 Circuits and Networks II	3.5
EE 210 Circuits and Networks I		3.5	EE 380 Microprocessors	4
MATH 331 Diff. Equations		3	MATH 237 Calculus III	4
PHYS 265 Physics II		4	ECON 202 Economics	3
CS 239 Prob. Solving Using Comp.		3	Literature (B-I)	3
Foreign Lang. (A-II)		3	Total Hours	17.5
Total Hours		17.5		
Junior: Fall		Hrs.	Junior: Spring	Hrs.
EE 345 Electronics		4	EE 300 EE Design III	1
EE 473 Intro. to EM Fields or		3	EE 420 Signals & Linear Sys.	3
PHYS 440			EE 431 Intro. to Power Systems	3
Engineering/Science Elec		3	EE 479 Optoelectronics	2
Math 307 Linear Algebra or MATH		3	STAT 301 Applied Stats.	3
350 Adv. Engineering Math		3	ENG 300 Composition	3
Category B Elective		3	Category E Elective	3
Category F Elective		1	Total Hours	18
Total Hours		17		
Senior: Fall		Hrs.	Senior: Spring	Hrs.
EE 400 EE Design IV		1	EE 401 Capstone Design	3
EE 405 EE Senior Research Sem.		1	EE 450/451 Digital Signal Proc.	4
EE 410/411 Computer Design		4	EE 470/475 Communications	4
EE 460 Cont. Control Systems		4	EE Senior Elective	3
Engineering/Science Elect		3	Category B Elective	3
Category C Elective		3	Total Hours	17
Total Hours		16		
Grand Total Hours: 135				
EE Senior Elective		Hrs.	Science Elective	Hrs.
EE 432 Power Systems II		3	BIOL 120 Biological Concepts	3
EE 443 Microfabrication and MEMS		3	CHEM 116 Intro College Chem	3
EE 445 Advanced Electronics		3	CHEM 120 College Chemistry I	3
EE 461 Discrete Control Sys		3	ENV 280 Environmental Sc.	3
EE 462 Special Topics in Control		3	GEOL 111 The Earth	3
EE 477 Numerical Tech.		3		
EE 490 Robotics		3		
<i>(A-F) Denotes General Education Category</i>				

- Circuits and Electronics
- Communication and Signal Processing
- Electrical Power Systems
- Computer Hardware and Embedded Systems
- Robotics, Control Systems and Automation
- Biomedical Applications
- Automotive and Aerospace Systems
- Manufacturing plants

The major in electrical engineering (reference number 537) leads to a Bachelor of Science degree.. This degree is jointly offered by Western Kentucky University and the University of Louisville for students in residence at Western.

The curriculum requires a minimum of 63-65 technical specialty hours and 27 semester hours of required science and mathematics courses.

Academic Standards for the WKU/UofL Joint Electrical Engineering Program

Students are admitted as a pre-major in Electrical Engineering. In order to transition from the pre-major to major and to graduate with a degree in Electrical Engineering, students must complete the following courses earning a grade of "C" or better in each course.

- EE 101 EE Design I or EE 175 - University Experience
- EE 180 - Digital Circuits (4 hours)
- EE 210 – Circuits & Networks (3.5 hours)
- ENG 100 - Freshman English (3 hours)
- COMM 145 or 161 - Public or Business Speaking (3 hours)
- MATH 136 - Calculus and Analytical Geometry I (4 hours)
- MATH 137 - Calculus and Analytical Geometry II (4 hours)
- PHYS 255/256 - University Physics I and Lab (5 hours)
- PHYS 265 - University Physics II (4 hours)
- CS 239 – Problem Solving Comp Tech (3 hours)

In addition, each student's transcript must have at least 16 hours of EE credit in the major taught by a UofL faculty member.

Engineering/Science Electives (must take at least 6 hours)

- EM 221 or EM 222 or PHYS 350 (3 hours)
- ME 365 or ME 220 or PHYS 330 (3 hours)
- ME 240 Materials and Methods of Manufacturing (3 hours)
- ME 330 or CE 341 or CE 342 (3 hours)
- PHYS 450 Classical Mechanics II (3 hours)
- PHYS 318 Data Acquisition Using Labview (3 hours)

Electrical Engineering Program Mission

The mission of our Electrical Engineering Program at WKU is to build a foundation of knowledge in electrical engineering by integrating a variety of project experiences at every level throughout the curriculum.

Our program is to be relevant to our region and to produce graduates who can immediately contribute to the profitability of their employer.

Our graduates should be:

- Practical problem solvers with abstract thinking skills.
- Life-long learners capable of building their careers upon a solid foundation of knowledge.
- Competent in communicating technical materials and concepts in individual and group situations.
- Able to apply with confidence the basic sciences and mathematics to their professional activities, and
- Acclimated to individual and team project activities based upon numerous experiences relating to our project-based, industry-related curriculum.

Our faculty must be:

- Excellent teachers
- Competent in their profession as engineers, and
- Capable of integrating projects into all aspects of our engineering curriculum to the extent practicable.

The program achieves its mission by focusing on specific educational objectives. They are:

- **Objective 1:** Our graduates are prepared to pursue successful and productive engineering careers and are technically competent with the ability to analyze and solve electrical engineering problems.
- **Objective 2:** Our graduates are application-oriented problem solvers, accomplishing solutions through sound engineering and economic practice.
- **Objective 3:** Our graduates are involved in continuing professional development and lifelong learning.
- **Objective 4:** Our graduates practice engineering in a professional manner demonstrating an awareness of legal and ethical responsibilities.
- **Objective 5:** Our graduates have the ability to effectively communicate their ideas and designs.

Minor in Electrical Engineering

The minor in electrical engineering (reference number 354) requires a minimum of 21 semester hours in electrical engineering. The required courses include EE 210 and EE 211. Students, with the approval of an EE advisor, select additional electrical engineering courses to complete the minor; at least 11 hours must be at the 300-level or above. Students majoring in electrical engineering cannot earn a minor in electrical engineering. EE 350 does not count towards the EE minor.

Major in Mechanical Engineering

Program Coordinator: J. Lenoir

Mechanical engineers are involved in designing and building almost everything that is needed in our modern world, from nearly invisible electro-mechanical devices to enormous power generating and distribution systems producing millions of horsepower. Mechanical engineers use scientific principles from the physical world to create a tremendous variety of mechanical and thermal systems. Practicing mechanical engineers use these principles to design, analyze, manufacture and maintain systems that include:

- automobiles and aircraft
- heating and cooling systems
- electric power plants
- specialized materials
- manufacturing plants
- industrial equipment and machinery

Mechanical engineers need a solid understanding of engineering science, which includes mechanics, engineering materials, thermodynamics and fluid mechanics. The program at Western focuses on these sciences as well as design and professional skills necessary for a successful career in mechanical engineering.

The major in Mechanical Engineering (reference number 543) leads to a Bachelor of Science degree. This degree is jointly offered by WKU and the University of Kentucky for students in residence at Western. The curriculum requires a minimum of 67-68 technical specialty hours, completion of required general education, and 23.5 semester hours of required mathematics and science.

Academic Standards for the WKU/UK Joint Mechanical Engineering Program

Students are admitted as a Pre-Major in Mechanical Engineering. In order to transition from Pre-Major to Major and to graduate with a degree in Mechanical Engineering, students must earn a GPA of 2.5 in the following courses and a grade of "C" or better in each course in the list. This requirement must be completed before enrolling in ME 300: Junior Design.

- ME 175: University Experience (or ME 176 for transfers) (2/1 hours)
- ENG 100: Freshman English (3 hours)
- HIST 119 or 120: Western Civilization (3 hours)
- COMM 145 or 161: (3 hours)
- MATH 136: Calculus and Analytic Geometry I (4 hours)
- MATH 137: Calculus and Analytic Geometry II (4 hours)

- ME 180: Freshman Design II (3 hours)
- PHYS 255/256: University Physics I and Laboratory (5 hours)
- CHEM 120/121: College Chemistry I and Laboratory (5 hours)
- ME 240/241: Materials and Methods of Manufacturing (4 hours)

TOTAL 36 hrs

After satisfying the requirements to transition from Pre-Major to Major in Mechanical Engineering, the students must also earn a grade of C or better in the following courses required for the major: EM 221, 303, ME 200, 220, 310, 330, 347, MATH 237, 331.

Each mechanical engineering student's transcript must include at least 16 hours of credit in the major taught by UK faculty members.

Each mechanical engineering student must also take at least one mathematics elective. This elective must meet three criteria:

- It must be a course offered by the Department of Mathematics.
- It must not be a course repeating subject matter already covered in a required course.
- It must be of a level greater than or equal to the required courses in mathematics.

Suggested Program of Study			
Mechanical Engineering Curriculum			
Fall Semester	Hrs.	Spring Semester	Hrs.
ME 175/176 Univ. Experience	2 or 1	ME 180 Freshman Design II	3
CHEM 120/121 Chemistry I & LAB (4,1)	5	MATH 137 Calculus II	4
MATH 136 Calculus I	4	PHYS 255/256 Physics I & LAB (3,2)	5
ENG 100 Freshman Eng.	3	HIST 119/120 Western Civ.	3
COMM 145 or 161 Public Spkg.	3	Foreign Language	3
	17		18
MATH 237 Multivariable Calc.	4	ME 200 Sophomore Design	3
EM 221 UK Statics	3	MATH 331 Diff. Equations	3
ME 240/241 Mat./Meth. & LAB (3,1)	5	EM 313 Dynamics	3
PHYS 265/266 Physics II & LAB (4,1)	4	ME 285 Fundamentals Ind. Auto	3
ENG 200 Intro. to Literature	3	EM 303 WKU Mechs. Of D. Solids	1
	19	ME 347 Mech. Systems Lab	1
		Category B Elective 1 of 2	3
			17
ME 220 Eng. Thermo I	3	ME 300 Junior Design	2
ME 344 Mechanical Design	3	ME 310 Eng. Instrumentation	3
EE 350 EE Fundamentals	4	ME 321 Eng. Thermo II	3
MATH --- Math Elective 1 of 1	3	ME 330 Fluid Mechanics	3
Category C Elective 1 of 2	3	ME - ME Tech Elective 1 of 3	3
Category F Elective 1 of 2	1	ENG 300 Junior English	3
	17		17
ME 325 Heat Transfer	3	ME 412 ME Senior Project	3
ME 416 UK Dyn. Systems Elective	3	ME - ME Tech. Elective 3 of 3	3
ME 400 Mech. Engr. Design	2	Category C Elective 2 of 2	3
ME 440 Therm/Fluids Lab	2	Category B Elective 2 of 2	3
ME 445 Dynamic Systems Lab	2	Category E Elective 1 of 1	3
ME - ME Tech. Elective 2 of 3	3	Category F Elective 2 of 2	1
	15		16
Program Total = 135 Hours			

Mechanical Engineering Program Mission

The mechanical engineering program produces graduates who are well prepared for the start of productive, successful careers as practicing engineers.

Our graduates have a strong competitive advantage with their unique background of engineering fundamentals combined with practical knowledge and experience.

The mechanical engineering program provides a project-based, learner-driven environment relevant to the needs of our region. In support of this learning environment, the professional engineering activities of the faculty create opportunities for the students to practice the art and science of contemporary Mechanical Engineering.

The program achieves its mission by focusing on specific educational objectives. They are:

Technical

- Our graduates have demonstrated competence in the use of scientific, technical, and professional skills for the practice of Mechanical Engineering.
- Our graduates have demonstrated the ability to identify problem causation and have implemented practical, application-oriented solutions.
- Our graduates have demonstrated the ability to find additional knowledge necessary to solve unfamiliar problems.

Professional

- Our graduates have exhibited excellent two-way communication skills (written, oral, visual, and graphical) with a wide variety of audiences.
- Our graduates have demonstrated ethical professional behavior and a comprehension of the breadth of the Engineer's professional roles and responsibilities.

Societal

- Our graduates have adapted to an ever-changing world by engaging in life-long learning and professional development activities.
- Our graduates have contributed to their region's economic development through their professional practice.

Department of Geography and Geology

Programs offered by the Department of Geography and Geology are designed to meet the career goals of students in a wide variety of geoscience areas. Over the past twenty years, most of our program graduates have found employment in their preferred professions.

Geography courses provide a scientific foundation for the investigation and understanding of the physical and biological environments, the nature of social, political and economic activity, and the interaction between humans and the environment. Collectively, these courses offer basic professional training for geographers and planners, as well as providing geographic training for prospective elementary, middle, and high school teachers. They are also an essential component of international programs offered by the university in Latin American, Asian, African, and Canadian studies, and in International business. Geography is considered an essential life skill.

Geography prepares students for service as water and environmental resource managers, city and regional planners, industrial and commercial consultants, meteorologists and climatologists, cartographers, G.I.S. analysts, educators, and government employees in a wide range of national, state, and local agencies. Environmental Planning, Resource Management, and Sustainable Development are interdisciplinary specialties of the Department and many graduates work for the National Park Service, National Forest Service, and other management agencies. Majors in Meteorology and Geographic Information Science (GIS) prepare students for professional careers in the atmospheric sciences and in positions that demand sophisticated spatial analytical techniques.

Geology courses provide the basic professional foundation for the scientific investigation of the Earth as well as geological education for the prospective teacher. Geology majors may enter positions in industry and government agencies. Many geologists work in interdisciplinary fields such as hydrology, energy, environmental and engineering geology, geophysics, and geochemistry. Geologists are needed in many areas for basic Earth research, for exploration and development of natural resources, and to address various environmental problems. Students are prepared for a variety of interesting and important career positions in federal and state agencies, engineering and environmental firms, and other areas of private industry, including oil, gas, and coal companies. In addition to the traditional BS degree in geology, majors may also select A.B. options in earth and space science or general geoscience. The geology program also prepares students for eventual certification as a Professional Geologist.

When planning a program of study in this department, each student should be aware of the University's academic requirements and regulations contained in this catalog in the chapter, "Academic Information." Specific attention should be given to the subsections in the chapters entitled (a) Academic Programs, (b) General Education Requirements, and (c) Academic Requirements and Regulations. Students should be aware that some academic programs may require additional scholastic regulations and standards not specified in the catalog. To obtain a copy of these regulations, students should contact the department head.

The four-year plan for timely completion of a geography, meteorology, GIS, or geology major appears on the departmental website at: www.wku.edu/geoweb/aboutgeo.php. A five-year bachelors/masters in geography, geology, meteorology, or GIS and geoscience is in development so that motivated students can focus their research interests

Dr. David J. Keeling, Head

Environmental Sciences and Technology Building

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Wendy Decroix: Office Coordinator

Professors: S. Foster, C. Groves, D. Keeling, R. Mahmood, M. May

Associate Professors: K. Algeo, J. All G. Goodrich, F. Siewers, A. Wulff, J. Yan

Assistant Professors: A. Celestian, J. Durkee, X. Fan, M. Gripshover, L. North, J. Polk

Instructors: W. Blackburn, K. Cary, M. Crowder, S. Dobler, J. Islas, D. Kreitzer, A. Nemon, D. Reader

and gain a Master's degree in an expedited timeframe. Five-year bachelors/masters programs can be tailored to meet other research interests for motivated students.

Major in Geographic Information Science

The major in geographic information science (reference number 576) focuses on the concepts and principles of GISystems, along with its four components: (1) input, corrections, and collection of geospatial data; (2) storage and retrieval of geospatial data; (3) manipulation and analysis of geospatial data; and (4) maps and other forms of presentation of geospatial data. The major in geographic information science (reference number 576) requires a minimum of 58 semester hours of GIS courses. The following 22 hours are foundation requirements: AMS 163, CS 145, 146, GEOG 100 or GEOL 102, GEOG 110, GEOG 475 or 495, and GEOG 499. The following 14 hours are technique requirements: GEOG 300, 316, 317, and 391. The following 22 hours are professional requirements: GEOG 414, 417, 418, 419, 443, 477, and 492. Required support courses are CE 160-161, CS 240, ENG 307, MATH 118 (or MATH 116 or 117) and MATH 136. Qualified students may omit MATH 118 and start with MATH 136. GIS courses require a course fee.

Major in Meteorology

The major in meteorology (reference number 578) leads to a Bachelor of Science in Meteorology and requires a minimum of 49.5 semester hours of meteorology, geography, and computer science. A minor program is not required. Other required courses in physics and mathematics total an additional 26 semester hours. Students majoring in meteorology will learn the key concepts and skills necessary to qualify as a meteorologist for the National Weather Service, and to meet the standards of the American Meteorological Society. The following 10 hours are foundation requirements: GEOG 100 or GEOL 102 or GEOL 111, GEOG 110, 121, and 499. The following 10 hours are technique requirements: GEOG 300, 316, 391. The following 10 hours are thematic requirements: GEOG 422, 424, and CS 240. The following 19.5 hours are professional requirements: GEOG 325, 431, 432, 433, 437, 438, CS 245. The following are additional courses required outside of the major: PHYS 255/256, 265/266, MATH 136, 137, 237, and 331.

Major in Geography

The major in geography (reference number 674) requires a minimum of 36 semester hours and leads to a Bachelor of Science degree. A minor or second major is required. Required courses totaling 30 - 32 hours are required for each area of concentration, with an additional 3-6 hours chosen from specified electives. Incoming freshmen are encouraged to take GEOG 175 (University Experience) as preparation for the major.

Students majoring in geography will develop, with their advisor, a group of courses designed to meet their specific needs within the framework of departmental offerings.

At present, the department offers six specific areas of concentration with a required course of study. These areas of concentration with their specific curricula are as follows:

Environmental Planning and Resource Management

- Foundation Requirements (13 hours): GEOG 100 or GEOL 102, GEOG 110, 280, 475 or 495, 499.
- Thematic Requirements (9 hours): GEOG 328, 471, 474.
- Technique Requirements (10 hours): GEOG 300, 316, 391.
- General Electives (4 hours): GEOG 208, 209, 310, 317, 350, 380, 414, 417, 419, 444, 452, 455, 459, 461, 487, or GEOL 415.
- Program Total: 36 hours
- Additional requirements: MATH 118 (or MATH 116 and MATH 117) and one Ethics course: PHIL 320 or GEOG 444.

Planning and GIS

- Foundation Requirements (13 hours): GEOG 100 or GEOL 102, GEOG 110, 240, 475 or 495, 499.
- Thematic Requirements (10 hours): GEOG 317, 474, 484.
- Technique Requirements (10 hours): GEOG 300, 316, 391.
- General Electives (3 hours): GEOG 350, 360, 414, 416, 417, 419, 423, 451, 477, 480, 487, 488, 497.
- Program Total: 36 hours
- Additional Requirements: MATH 118 (or MATH 116 and 117), AMS 163, CIS/CS 226 or CS 146.

Land, Weather, and Climate

- Foundation Requirements (13 hours): GEOG 100 or GEOL 102 or GEOL 111, GEOG 110, 121, 475 or 495, 499.
- Thematic Requirements (7 hours): GEOG 322, 424 or 426.
- Technique Requirements (10 hours): GEOG 300, 316, 391.
- General Electives (6 hours): GEOG 122, 222, 310, 325, 328, 414, 420, 424 or 426, 482, 455, 459, 461, 471, GEOL 311, 325.
- Program Total: 36 hours
- Additional Requirements: MATH 118 (or 116/117), PHYS 201

Karst Geosciences

- Foundation Requirements (13 hours): GEOG 100 or GEOL 102 or GEOL 111, GEOG 110, GEOG 280, GEOG 475, GEOG 499
- Thematic Requirements (9-10 hours): GEOG 310 or 459, GEOG 461, 420 or 475
- Technique Requirements (10 hours): GEOG 300, 316, 391
- Approved Electives (3-4) hours): GEOG 208, 209, 317, 414, 417, 419, 444, 452, 455, 471, 474, 489, GEOL 415, 445
- Program Total: 36 hours
- Additional Requirements: MATH 136, CHEM 120, and BIOL 120 or PHYS 201

Cultural Geography

- Foundation Requirements (14 hours): GEOG 100 or GEOL 102, GEOG 110, 330, 430, 475 or 495, 499.
- Regional Requirements (6 hours): Choose two courses from GEOG 200, 360, 451, 454, 462, 464, 465, 466, 467.
- Thematic Requirements (6 hours): Choose two courses from: GEOG 350, 378, 480, 481.
- Technique Requirements (10 hours): GEOG 300, 316, 391.
- Program Total: 36 hours
- Additional requirement: MATH 118 (or MATH 116 and MATH 117)

Geography Honors

- Program Requirements (30 hours): GEOG 100 (Honors), 110 (Honors), 300, 316, 391, HONS 300, HONS 301, Honors Enriched Embedded Courses (10 hours), 499
- Program Electives (6 hours): HONS 403 Thesis for 6 hours, or 475 or 495
- Program Total 36 Hours
- Additional Requirements: MATH 118 (or MATH 116 and 117), one Ethics course: PHIL 320 or GEOG 444.

Four-Year Degree Program

By taking the courses required of all majors during the freshman, sophomore, and junior years and the courses required for the specific concentrations during the sophomore, junior, and senior years, a student may graduate in four years. Recommended semester-by-semester schedules can be obtained from advisors, the department office, or the department website: www.wku.edu/geoweb/aboutgeo.php.

Major in Geology

The geology program offers four distinct major concentrations, depending on the career goals of the student.

The professional major in geology (reference number 677) is for students seeking careers as a professional geologist and requires a minimum of 40 semester hours and leads to a Bachelor of Science degree. A minor or second major is required. This major provides students with a solid background in all traditional areas of geology for entry-level employment or graduate school. Incoming freshmen are encouraged to take GEOG 175 (University Experience) as preparation for the major.

Professional Major (reference number 677)

- Program Requirements - 31 hours
- GEOL 111, 112, 113, 114, 270, 308, 330, 350, 380, 460, 499
- Program Electives - 9 hours
- Any 9 hours of approved geology electives

Additional requirements include: MATH 136, BIOL 122-123, CHEM 120-121, CS 146, GEOG 316, 317, 391, and an approved geology field camp or completion of the WKU certificate in Geographic Information Systems (GIS).

The professional extended major in geology (reference number 577) is for students seeking a comprehensive background in the essential content areas within the discipline of geology as defined by the Association of State Boards of Geology. Students who complete this program will be prepared to pass the nationally standardized ASBOG examination, which is one step in the process of achieving professional registration and becoming practicing, professional geologists.

Professional Extended Major (reference number 577)

- Program Requirements - 40 hours
- GEOL 111, 112, 113, 114, 270, 308, 310 (or GEOG 310), 330, 350, 380, 415, 460, 485, 499
- Program Electives - 12 hours
- Any 12 hours of approved geology electives

Additional requirements include: MATH 136, BIOL 122-123, CHEM 120-121, CS 146, GEOG 316, 317, 391, and an approved geology field camp or completion of the WKU certificate in Geographic Information Systems (GIS).

The earth and space science and general geoscience concentrations in geology (reference number 676) are for students who either seek the content knowledge needed to qualify for teacher certification in Kentucky in Earth and Space Science or who do not intend to practice professional geology. This major leads to a Bachelor of Arts degree.

Earth and Space Science Concentration (reference number 676)

- Program Requirements - 26 hours
- GEOL 111, 112, 113, 114, 308, 311, 325, 380, 460, 499
- Program Electives - 6 hours
- Any 6 hours of approved geology electives

Additional requirements include: MATH 116, PHYS 201, CS 145, GEOG 121, ASTR 104, 106, 405, and a minor field.

General Geoscience Concentration (reference number 676)

- Program Requirements - 26 hours
- GEOL 111, 112, 113, 114, 308, 311, 325, 380, 460, 499
- Program Electives - 6 hours
- Any 6 hours of approved geology electives

Additional requirements include: MATH 116, CHEM 105/106, PHYS 201, CS 146, GEOG 121, GEOG 316, and a minor field.

Minor in Geography

The minor in geography (reference number 374) requires a minimum of 21 semester hours. Required courses are GEOG 100, 110, 330, one technique course selected from 300, 316, 317, 391, 417, 419, and 452, and 9 hours of upper-division electives chosen in consultation with your advisor.

Department advisors should be contacted to develop a course of study compatible with the department's philosophy and the student's needs.

Minor in Geology

The minor in geology (reference number 377) requires a minimum of 21 semester hours. Required courses are GEOL 111, 112, 113, and 114. Two additional courses must be selected from GEOL 308, 330, 350, 380, 405, 460. Additional geology courses, to total a minimum of 5 hours, are to be chosen in consultation with a geology advisor.

Minor in Earth Science

The minor in earth science (reference number 353) is for prospective earth science teachers and requires a minimum of 21 semester hours. Required courses are GEOL 111, 112, 113, 114, GEOG 121, and ASTR 214. Courses to total seven additional hours must be elected from GEOL 308, 330, 370, 405, 420, and GEOG 328 and 420. A minor in earth science must be taken in conjunction with a major or minor in another science or in mathematics.

Minor in City and Regional Planning

The minor in city and regional planning (reference number 339) is designed to develop an academic foundation for students interested in pursuing careers in planning agencies, Geographic Information Sciences, and other

government public-service organizations. This minor, in conjunction with an appropriate major, provides a basic foundation for students seeking to pursue graduate or professional studies in the field of city and regional planning.

Two tracks are available in this minor. The Management Track requires GEOG 240, 484, one technique course chosen from GEOG 316, 300, 317, 391, 414, 417, 419, and 452; six hours chosen from GEOG 423, 434, 474, 480, 488, and 495; and six elective hours selected in consultation with the advisor. The GIS Analysis Track requires GEOG 240, 484, and 317; six hours chosen from GEOG 417, 474, 488, and 495; and 6 hours of electives chosen from GEOG 316, 419, 423, and 480 in consultation with your advisor. A minimum of 21 semester hours is required for completion of the minor.

Minor in Water Resources

This 22-hour minor program (reference number 491) provides a foundation in the physical and social science aspects of water resource management and policy. The minor is appropriate for students interested in careers in applied hydrology and/or water resources management and policy. Required courses (16 hours) include GEOL 111/113 and GEOG 121, 310, 427, and 474. Restricted elective courses (6 hours) include GEOL 415, 440, 445, GEOG 422, 426, 428, and 487.

Minor in Geographic Information Systems

This 23-hour minor program (reference number 366) provides a foundation in Geographic Information Systems (GIS). The minor is appropriate for students interested in careers utilizing GIS as a tool in areas such as geography, geology, biology, political science, business, journalism and broadcasting, engineering, and public health, or for students pursuing GIS as a profession in a related discipline such as Computer Science or Computer Information Systems. Required courses (23 hours) include GEOG 100 or GEOL 111, GEOG 110, 316, 317, 417, 419, and GEOG 414 or 477 (Remote Sensing or GIS Special Topics).

Minor in Environmental Studies

The environmental studies minor (reference number 363) is designed to provide a broad-based intellectual foundation for students interested in pursuing careers in environmental management and related areas. The minor is intended for natural science majors, as well as for students majoring in business, psychology, journalism, and other social science and humanities disciplines.

Requirements: The environmental studies minor requires 25 semester hours, including a 13-hour core and 12 hours of electives. Students must have at least 12 hours of coursework from outside their major program. Half of the hours in the minor must be at the 300- or 400-level.

Core Courses (13 hours):

A. Introduction to Environmental Science (3 hours): ENV 280, PH 280, CHEM 280, or GEOG 280. These courses present basic environmental concepts and their applications but with different emphases, allowing a student to select that which most closely parallels his/her individual interests.

B. Biological Concepts: Evolution, Diversity, Ecology (4 hours): BIOL 122/123.

The selected courses above should be taken during the sophomore year and no later than the fall semester of the third year.

C. Earth Science course (3 hours): GEOG 100 or GEOG 121 or GEOL 102, or GEOL 111. These courses present a common body of basic earth science but with different emphases.

D. Practicum Experience (3 hours): BIOL 369 or 389 or GEOG 495, or CHEM 489, or ENV 475 or 491. An approved capstone project, supervised practicum, or cooperative education experience in the senior year.

Elective Courses (12 hours): The remaining 12 hours of the minor are to be selected from the list of courses identified from the offerings of several departments. The specific courses to be taken will be determined after consultation with one of the environmental studies minor advisors. A sufficient number of offerings has been identified to allow the selection of a sequence that corresponds closely to the students interests. At least two departments must be represented in the 12 hours of elective coursework.

Department of Agriculture: AGRO 350/351, 454

Department of Architectural and Manufacturing Sciences: AMS 470

Department of Biology: BIOL 207/208, 315, 420, 446

Advisors:

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Building, room 304
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Department of Chemistry: CHEM 314, 446

Department of Engineering: CE 351

Department of Geography and Geology: GEOG 328, 427, 455, 474; GEOG/GEOL 310; GEOL 415

Department of Public Health: ENV 375, 460, 480, PH 385

Department of Philosophy and Religion: RELS 408

Minor in Sustainability

The minor in sustainability (reference number 475) requires 21 semester hours. The minor provides students with the environmental science knowledge and the theoretical foundation to approach decision making in a way that is sustainable for the long term. They will understand how both individual and societal decision-making impacts the environment. Completion of the minor will enable students to examine objectively the impact of specific human activities on the environment and how to mitigate the negative ramifications.

The following courses are required for the 21 hours in the minor (12 hours must be upper-level):

- Three courses in the foundation and capstone areas (9 hours total): GEOG 280, 380, and GEOG 495 or 489.
- At least one course from each of the following four clusters (12 hours total). Note—No more than 6 hours of cluster courses can be taken from any single discipline:
 - Cluster A: Ethics and Human Behavior—ANTH 442, GEOG 444, SOCL 470
 - Cluster B: Economics, Law, and Policy—ECON 430, GEOG 471, 487
 - Cluster C: Physical Systems and the Environment—BIOL 315, GEOL 415, GEOG 427, 455, ENV 375, PH 385, PHYS 100.
 - Cluster D: Planning and Land-Use—AGRO 454, AMS 470, CE 351, GEOG 474, ENV 460

Geographic Information Systems Certificate (14 hours)

Geographic Information Systems technology is widely used in business and industry, government, and education. This certificate (reference number 174) is designed for students in a variety of disciplines that involve the analysis, mapping, and interpretation of geographic data. Students who complete the program will have a solid foundation that spans the collection, management, analysis, interpretation, and display of data using geographic information systems. They will gain practical experience by completing projects that require the use of sophisticated GIS functions. Finally, they will learn how to develop and implement customized GIS applications.

The program is housed in the Department of Geography and Geology. It consists of a series of four courses taken for a total of 14 credit hours. The courses are GEOG 316, 317, 417, and 419.

Graduate Degree Programs

The Master of Science in geoscience programs are designed to provide advanced training for those students pursuing administrative and other higher level employment or who plan to continue their graduate education at other universities offering Ph.D. degrees. Undergraduate students who plan early can continue their education and receive a bachelors and masters within five years in the department. While the specializations in geography and geology are similar to those offered at the undergraduate level, emphasis is placed on independent research under the guidance of a graduate advisor. There are many funded research projects within the Department for qualified students. Graduate students are required to write a Master's thesis that derives from independent research in a topic of their choosing, .

The department also cooperates with the College of Education in offering a Master of Arts in Education – Geography Education for Teacher Leaders degree with emphases on cultural geography for social studies teachers and earth science for STEM teachers .

A number of assistantships are available to outstanding graduate students. For further information see the Graduate Studies Catalog or contact the Office of Graduate Studies.

Department of Mathematics and Computer Science

Mathematics and computer science courses at the University are designed with the interests and needs of varying groups of students in mind.

Mathematics majors are available to those planning to pursue careers in secondary and middle grades education as well as to those whose preparation is being directed toward positions in business and industry or toward further work in mathematics at the graduate level. In addition, several courses are offered to meet the demands for the mathematical training of students whose major educational objectives are not directly related to mathematics. Mathematics majors are assigned advisors from among the departmental faculty and are required to consult with these advisors before each registration period.

Computer science remains one of the most exciting and most rapidly growing professions worldwide. The supply of graduates with CS degrees is far exceeded by the demand for professionals at all levels. Such positions include applications programming, systems programming, software and network management, field maintenance and sales, research, and teaching. Many new areas of interest continue to emerge, such as animation, games, and simulation. Computer scientists offer expertise in the effective and efficient use of computers for industry, business, government, research and education.

Recent studies have estimated that the field continues to be among the top two or three in demand. For the last several years, Computer Science graduates with a bachelor's degree currently have commanded the second-highest starting salary for all undergraduate disciplines, according to the College Placement Council Survey.

According to a report from the Kentucky Department for Employment Services, Computer Support Specialists, Computer Software Engineers and Computer Systems Analysts are the three projected fastest growing occupations.

When planning a program of study in this department, each student should be aware of the University's academic requirements and regulations contained in this catalog in the chapter "Academic Information." Specific attention should be given to the sub-sections in the chapter entitled (a) Academic Programs, (b) General Education Requirements, and (c) Academic Requirements and Regulations.

Students should be aware that some academic programs may require additional scholastic regulations and standards not specified in the catalog. To obtain a copy of these regulations, students should contact the department head.

This department offers the following majors and minors:

- **Major:** Non-teacher certifiable major in mathematics (reference number 728)
- **Major:** Mathematics extended major for employment in industry and/or graduate studies in mathematics (reference number 528)
- **Major:** Mathematics major certifiable for teaching secondary level mathematics (reference number 728)
- **Major:** Middle grades mathematics (reference number 730)
- **Major:** Mathematical Economics (reference number 731)
- **Major:** Computer Science with concentration in Systems/Scientific Applications (reference number 629)
- **Major:** Computer Science with Specialty concentration (reference number 629)
- **Major:** Computer Science with any minor (reference number 629)

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Professor Mark Robinson, Assistant Department Head (Mathematics)

Professor David Neal, Lead Advisor (Mathematics)

Associate Professor James Gary, Lead Advisor (Computer Science)

Professors: F. Atici, M. Atici, R. Crawford, D. Erbach, C. Ernst, P. Hamburger, N. Iraniparast, B. Kessler, D. Neal, T. Richmond, M. Robinson, A. Shindhelm, J. Spraker, W. Weidemann, U. Ziegler

Associate Professors: J. Gary, D. Lanphier, V. Moody, L. Nguyen, Z. Xia, G. Xing

Assistant Professors: M. Autin, S. Bateiha, T. Bhattacharya, M. Dunkum, J. Gische, M. Kenner, Q. Li, H. Marchionda, S. Munasinghe, N. Nguyen, A. Por, J. Quiton, R. Schugart, H. Wang, D. Wu, R. Yang

Instructors: R. Ayers, J. Curtis, L. Fitzpatrick, T. Harris, L. Plumlee, L. Rogers, C. Shen, L. Wells

Transitional Retirees: J. Brantley, B. Brunson, J. Thornton

- **Minor:** Mathematics (reference number 417)
- **Minor:** Computer Science (reference number 341)
- **Minor:** Applied Statistics (reference number 313)

Admission Requirements

To be admitted to the major in mathematics (reference numbers 728 and 528) students must complete the following admission requirements:

- Earn a C or better in each of the following courses: MATH 136, 137, and 307 (or 310).
- Have an overall GPA of at least 2.4 in the mathematics program courses completed prior to admission (MATH 136, 137, and 307 (or 310)).
- Note: If a course is repeated, then the second grade is used to compute the GPA. If a course is repeated multiple times, then the average of all grades after the first attempt is used to compute the GPA.

Major in Mathematics

A major in mathematics provides a Bachelor of Arts degree and requires either a minimum of 36-39 semester hours for a general major with a minor or second major (reference number 728) or a minimum of 51 semester hours for an extended major (reference number 528). Note: All mathematics courses listed as prerequisites for other courses must have been completed with a grade of C or better.

Students who wish to declare a 728 or 528 mathematics major will initially be designated as “seeking admission” until the following requirements have been satisfied:

- Complete MATH 136, 137, and 307 or 310, with a grade of C or better in each course.
- Have an overall GPA of at least 2.4 in mathematics program courses (MATH 136 and above) completed prior to admission.

The general major (728) offers two options: (1) Non-teacher certifiable Major in Mathematics; (2) Major Certifiable for Teaching Secondary Level Mathematics. The extended major (528) offers only the first option. Option 1 students are required to complete both CS 180 and 181. Option 2 students are required to complete either CS 170 or 180.

Option 1: Non-Teacher Certifiable Major in Mathematics

(A) General Major (728): To prepare for employment in industry, the student must complete a minimum of 39 hours of mathematics with a minor or second major giving a total of at least 59 hours (53 unduplicated) with the following requirements:

1. MATH 136, 137, 237, 307, 310, 317, 337, 498.
2. Two courses from: MATH 405, 406, 415, 417, 423, 431, 432, 435, 439, 450, 470, 473, 482.
3. Six elective hours from: MATH 275 (up to 3 hours), STAT 301, MATH 305, 315, 323, 331, 370, 382, 398 (up to 3 hours), 405, 406, 415, 417, 423, 432, 435, 439, 450, 470, 475 (up to 6 hours), 482.
4. Students may take certain 500-level mathematics courses for undergraduate credit with the approval of the Dept. Head in place of courses listed in items 2 or 3.
5. In addition, 12 credit hours of supporting courses from the Ogden College of Science and Engineering or Gordon Ford College of Business (courses such as mathematics, statistics, sciences, engineering, economics, finance and accounting) are required. These courses must be approved by the mathematics and computer science department head. These hours will not count toward a first minor nor usually toward a second major.
6. Also required is PHIL 215 or EE 180.
7. Note: This major is not intended to prepare students adequately for graduate mathematics. Students intending to seek a graduate degree should pursue major 528.

(B) Extended Major (528): To prepare for graduate study in mathematics, the student must complete a minimum of 51 hours of mathematics with the following requirements:

1. MATH 136, 137, 237, 307, 310, 317, 337, 431, 498.
2. Have a concentration in one of the following areas: B1, B2, or B3.

B1: Fundamentals of Analysis and Discrete Mathematics:

- i. MATH 417, 439, 450
- ii. Two courses from: MATH 315, 323, 415, 423, 432, 473
- iii. Six additional elective hours from: MATH 275 (up to 3 hours), STAT 301, MATH 305, 315, 323, 331, 370, 382, 398 (up to 3 hours), 405, 406, 409, 415, 423, 432, 435, 470, 473, 475 (up to 6 hours), 482.

B2: Fundamentals of Applied Mathematics

- i. MATH 331, 370, 382, 405.
- ii. Two courses from: MATH 305, 406, 435, 470, 482
- iii. Three credit hours from MATH 275, STAT 301, MATH 305, 315, 323, 398, 406, 409, 415, 417, 423, 432, 435, 439, 450, 470, 473, 475, 482.

B3: Fundamentals of Mathematical Studies

- i. Math 450
- ii. Two courses from: MATH 405, 406, 409, 415, 417, 423, 432, 435, 439, 470, 473, 482.
- iii. Twelve additional elective hours from MATH 275 (up to 3 hours), STAT 301, MATH 305, 315, 323, 331, 370, 382, 398 (up to 3 hours), 405, 406, 409, 415, 423, 432, 435, 470, 473, 475 (up to 6 hours), 482.

3. Students may take certain 500-level mathematics courses for undergraduate credit in place of courses listed in items B1i, B1ii, B2i, B2ii, B3i, or B3ii with the approval of the mathematics and computer science department head. No minor or second major for the extended major is required.

Option 2: Major Certifiable for Teaching Secondary Level Mathematics

General Certifiable Major (reference number 728): The student must complete a minimum of 36 hours of mathematics with a second major in Science and Mathematics Education (SMED) and with the following requirements:

1. MATH 136, 137, 237, 304, 307, 310, 317, 323, 498; STAT 301. Before the “professional semester,” the student must complete each of these courses with a grade of “C” or better and achieve a GPA of at least 2.5 in required mathematics courses.
2. At least 3 hours of 400-level mathematics from the following list: MATH 405, 406, 409, 415, 417, 421, 423, 431, 432, 435, 439, 450, 470, 482.
3. Also required is PHIL 215 or EE 180.

Students in this option must have a second major in science and mathematics education (SMED). In addition, students must attain a grade of “C” or better in each required mathematics course and a 2.5 GPA for all required mathematics courses.

Major in Middle Grades Mathematics

A major in middle grades mathematics (reference number 730) is for students who plan to teach mathematics in grades 5-9 only. The degree requires a second major in science and mathematics education (SMED). Upon successful completion of both majors, the student will receive a Bachelor of Science degree.

Students who wish to declare a 730 middle grades mathematics major will initially be designated as “seeking admission” until the following requirements have been satisfied:

- Complete MATH 117 and MATH 136, or MATH 136 and MATH 137; and MATH 205, with a grade of C or better in each course.
- Have an overall GPA of at least 2.4 in all middle grades mathematics program courses (MATH 117 and above) completed prior to admission.

(If a course is repeated, then the second grade is used to compute the GPA. If a course is repeated multiple times, then the average of all grades after the first attempt is used to compute the GPA.)

The student must complete a minimum of 32 hours in mathematics by taking the following required courses: MATH 117 and 136 OR MATH 136 and 137; MATH 183 or STAT 301; MATH 205, 206, 304, 308, 403 or 323, 411 or 421, 413, 490.

Students must attain a grade of “C” or better in each required course and must have a 2.5 GPA overall in required mathematics courses.

Major in Mathematical Economics

The major in Mathematical Economics (reference number 731) requires 27 hours in Economics, 21 hours in Mathematics, and 1 hour of an interdisciplinary senior seminar course. This major leads to a Bachelor of Science degree intended for students interested in graduate studies in economics, public policy, or business, as well as those students seeking analytical careers that will require extensive mathematics backgrounds.

The program of study requires completion of a second major or a minor. The second major may not be economics, business economics, or mathematics. The minor may not be economics or mathematics.

All majors must complete a 40-hour core consisting of ECON 202, 203, 206 (or STAT 301), 302, 303, 306 or 307, 464, 465; MATH 136, 137, 237, 307; and ECON 497 or MATH 497. Additionally, either MATH 331 or 310 must be completed, and students must take three additional hours from either MATH 331, 310, 305, 382, 435, or 405. The remaining 3 hours in economics for completion may be selected from other 300 and 400 level economics courses.

Admission to the mathematical economics major requires (1) the completion of MATH 136, ECON 202 and 203, and ECON 206 or STAT 301 with a minimum GPA of 2.0 in the courses listed; and (2) completion of a minimum of 60 hours with a minimum GPA of 2.0 overall; and (3) completion of a minimum of 12 hours at Western Kentucky University with a minimum WKU GPA of 2.0. All mathematical economics majors will be required to enroll in an interdisciplinary senior seminar course prior to graduation (ECON 497 or MATH 497, 1 hour).

NOTE: A suggested Program of Study to complete each of the above in four years can be found on the Internet at: <http://www.wku.edu/~david.neal/advising/>.

Minor in Mathematics (Minor for Employment in Industry and/or Graduate Studies in Mathematics)

A minor in mathematics (reference number 417) requires a minimum of 24 semester hours. In addition to the foundational sequence (MATH 136, 137, 237, and either 307 or 370), the student is required to select at least nine hours from MATH 3XX*, MATH 4XX*, or STAT 301**.

*Students may not count MATH 304, 308, 403, 411, 413, 421, or 490 toward the minor. MATH 398 may count toward the minor only if the student completes MATH 498.

** Students may not count both MATH 382 and STAT 301 in the minor.

Minor in Applied Statistics

A minor in applied statistics (reference number 313) requires a minimum of 19 semester hours. This program is designed for a student seeking a career as a statistical programmer/analyst/consultant in a knowledge-based industry or in a research institution.

The student who elects a minor in applied statistics must complete a minimum of 13 credit hours, as follows: MATH 136 or 142; STAT 301, 330, and 401.

In addition, the student is required to take relevant elective courses to total at least 6 credit hours from the following: (1) any 300-level or 400-level STAT course other than STAT 301, 330, and 401; (2) MATH 382, 482, or 470; (3) at most 3 credit hours of 300-400 level statistical coursework relevant to the student's area of study (with prior approval from the Statistics Education Committee of the Department of Mathematics and Computer Science).

Grades K-5 Certification

All students seeking grades K-5 certification must satisfy the general education requirement in mathematics prior to enrolling in the required courses: MATH 205-206-308.

Certificate in Data Analysis using SAS®

The Certificate in Data Analysis using SAS (reference number 1716) requires a minimum of 15 semester hours. This certificate is designed for a student seeking a career as a statistical programmer/analyst/consultant in a knowledge-based industry or in a research institution.

To be eligible for the program, the student must have completed MATH 136 (formerly MATH 126) or MATH 142 (or equivalent) with a grade of C or better. The student pursuing a Certificate in Data Analysis using SAS must complete a minimum of 12 credit hours of core statistics courses as follows: STAT 301, 330, 401, 402. In addition, this student is required to take at least 3 credit hours of courses using SAS, selected from the following courses:

- Any 300-level or higher STAT course using SAS, other than STAT 301, 330, 401, and 402.

- MATH 498. Students are required to provide an electronic copy of their paper to the Statistics Education Committee of the Department of Mathematics and Computer Science to verify the use of SAS software.
- Any 300-level or higher course using SAS in another department, with prior approval from the Statistics Education Committee of the Department of Mathematics and Computer Science.

Computer Science Curriculum and Career Objectives

Courses in the computer science curriculum develop students' knowledge in both theory and applications. Where appropriate, they will discuss contributions from and to other disciplines such as mathematics, statistics, the sciences, engineering, management, etc.

The Systems/Scientific Concentration, Specialty Concentration, and Any Minor option, prepare students for a career in the research and development of computers and their applications. The computer science minor provides a valuable complement to almost any career objective. The graduate degree offers advanced work beyond the undergraduate computer science major. (See the section on Requirements for Computer Science Degree Options for specific course information.)

Student organizations complement the formal coursework. The student chapter of the Association for Computing Machinery (ACM) invites guest speakers, organizes a programming contest for students, and hosts social events throughout the year. The Department maintains a student chapter of Upsilon Pi Epsilon (UPE), the computer science honor society. Other more informal groups bring together students interested in specific areas, such as Linux and its applications, or computer game programming.

The University provides numerous computing laboratories across the campus to which all students have access. In addition, the computer science department has its own laboratories in the new Snell Hall. Some courses are taught in a laboratory environment.

Major in Computer Science

The major in computer science (reference number 629) requires a minimum of 44 semester hours. All CS courses counting toward the CS program major must be completed with a grade of "C" or better. Computer Science electives may include from 0-6 hours of 200-level courses. Adherence to all University Policies as indicated in the WKU catalog section "Academic Information." Additional requirements are as follows:

Systems/Scientific Applications Concentration

1. 47 hours of computer science courses are required.
2. ENG 307, MATH 136, STAT 301, and PHIL 215 are required.
3. Completion of these 11 CS core courses (35 credit hours): CS 180, 181, 251, 280, 325, 360, 380, 382, 396, 425, and 496.
4. Completion of 12 hours of CS electives from the following courses: CS 370, 381, 443, 445, 446, 450, and 456.
5. Completion of 2 courses from the following list: MATH 127, 137, 305, 307, 331, 405, 406, 470 and 473.
6. Completion of one year of a laboratory science (a two semester sequence of the same science) and one additional science course (all must be designed for Science/Engineering majors).
7. One additional course from the above list of MATH courses (this course may not be used to satisfy any other CS major degree requirement) or one additional science course designed for science/engineering majors.

Any Minor Option

1. 44 hours of computer science courses are required.
2. ENG 307, MATH 136, STAT 301, and PHIL 215 are required.
3. Completion of these 11 CS core courses (35 credit hours): CS 180, 181, 251, 280, 325, 360, 380, 382, 396, 425, and 496.
4. Completion of an additional 9 hours of CS electives at the 200-level or above (excluding CS 226 and 257) including 3 hours at the 400-level and another 3 hours at the 300-level or higher. Note; At most 1.5 hours of credit for CS 239 may count towards the major. At most 3 hours of credit for CS 239 and 245 (only for languages for which credit is not received through another course) may count towards the major.
5. Completion of any additional minor/major.

Specialty Concentration

1. 50 hours of computer science courses are required.
2. ENG 307, MATH 136, STAT 301, and PHIL 215 are required.
3. Completion of these 13 CS core courses (41 credit hours): CS 180, 181, 251, 280, 325, 360, 380, 381, 382, 396, 425, 443, and 496.
4. An additional 18 hours of specialty courses, selected in consultation with a CS advisor, not used to satisfy specific other graduation requirements for the CS major or for general education, including 9 hours of which are at the 300 level or above.
5. Completion of an additional 9 hours of CS electives at the 200-level or above (excluding CS 226 and 257) including 3 hours at the 400-level and another 3 hours at the 300-level or higher. Note: At most 1.5 hours of credit for CS 239 may count towards the major. At most 3 hours of credit for CS 239 and 245 (only for languages for which credit is not received through another course) may count towards the major.
6. **NOTE:** A suggested Program of Study to complete each of the above in four years can be found on the Internet at: <http://www.wku.edu/cs/undergraduate.php>.

Minor in Computer Science

The following 23 credit-hour program leads to a minor in computer science (reference number 341). All CS courses counting toward the CS program minor must be completed with a grade of "C" or better:

1. Completion of the following 11 credit hours: CS 180, 181, and 251 or 280.
2. Completion of at least 12 hours of CS courses at the 300-level or higher.
3. Completion of: MATH 119, MATH 122 or MATH 136, and PHIL 215.

Graduate Degree Programs

The Department of Mathematics and Computer Science offers graduate courses for the Master of Arts and Master of Science in mathematics and the Master of Science in computer science. Mathematics coursework is also provided for those seeking graduate degrees in elementary or middle grades education.

Several assistantships are available for qualified graduate students.

Additional information on admissions and graduate assistantships for the graduate programs in Mathematics can be obtained from:

Dr. Claus Ernst
Director of Graduate Studies in Mathematics
Phone: (270) 745-6224

The Master of Science in Computer Science is a 33 credit hour program. There are thesis and non-thesis options.

Additional information on admissions and graduate assistantships for the Master of Science in Computer Science can be obtained from:

Dr. Guangming Xing
Graduate Admission Advisor, Computer Science
Phone: (270) 745-8848

Department of Physics and Astronomy

The Department of Physics and Astronomy provides a multidimensional framework to support a variety of professional goals and interests of students. The curriculum available within the departmental program affords preparation for careers as physicists in government or industrial laboratories, for teaching in public schools or junior colleges, for entering advanced programs at the graduate level, or as a basis for studies leading to careers in engineering and other professional fields. Fundamental to the program are scientific facilities and faculty providing opportunities for practicing scientific inquiry, which is the basis for understanding the operation of the physical universe, from the smallest to the largest components.

Modern facilities and equipment enhance the instructional program of the department. Space on the first three floors of the Thompson Science Complex Central Wing provides classroom, laboratory, shop, research, and computing accommodations, as well as convenient access to the facilities of Academic Computing Services. The adjacent Hardin Planetarium supports astronomy laboratories and demonstrations for classes, as well as focused presentations of astronomy and the physical universe for school groups and the general public. A roof-top astronomical observatory provides students with convenient access to the department's 12.5 inch Cassegrain reflector and several smaller telescopes. The University Physics laboratories are equipped with modern laboratory equipment and data acquisition interfaces using software that is standard in the physics community. The Applied Physics Institute houses an X-ray diffractometer, neutron generator, Beowulf Computer Cluster and a Large Chamber Scanning Electron Microscope. From the beginning of their careers our students are exposed to modern laboratory methods.

The diversity of our faculty is a major strength of our undergraduate program, allowing students to benefit from a breadth of available interest and specializations. Undergraduate students are encouraged, in the course of their studies, to participate in a variety of research opportunities with faculty members. Individual student research projects may start as early as the sophomore year, supported in some cases by available assistantships or formal course credit. Descriptions of current research studies by faculty members and specific research opportunities available to undergraduate students are outlined on the department's website.

The department sponsors a local chapter of the nationally affiliated Society of Physics Students (SPS) for students interested in physics, as well as a section of the Sigma Pi Sigma honor society. The local SPS chapter sponsors or participates in a variety of social and service activities related to physics, including field trips, trips to scientific meetings, tutoring, and interacting with students from area schools.

The Hilltopper Astronomy Club provides support for students interested in astronomy both as a hobby and a science. Regular observing sessions, informal meetings, and various projects are some of the benefits available to members.

Physics is the basic science, and all of the programs outlined below are designed to provide a sound knowledge of physical principles. The programs are also flexible to the extent that the student can select related courses in biology, chemistry, geology or astronomy to prepare for a career in interdisciplinary areas such as biophysics, geophysics, environmental science or chemical physics.

When planning a program of study in this department, each student should be aware of the University academic requirements and regulations contained in this catalog in the chapter, "Academic Information." Specific attention should be given to the sub-sections in the chapter entitled (a) Academic Programs, (b) General Requirements, and (c) Academic Requirements and Regulations.

Major in Middle School Science

The middle school science education major (MSSE, reference number 734) is for students who plan to teach science in grades 5 through 9. The MSSE major requires completion of the science and mathematics education (SMED) program also. Upon successful completion of both majors, the student will earn a Bachelor of Science degree and will qualify for an institutional recommendation for a Kentucky Provisional Certificate for teaching in the middle grades (5-9) science field.

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P. Womble*

Associate Professors: *A. Barzilov,*

S. Bonham, I. Novikov, L. Strolger

Assistant Professors: *V. Dobrokhотов,
S. Gibson, E. Kintzel*

Professors Emeriti: *D. Bryant, K. Hackney, D.
Humphrey*

To earn the MSSE major, the student must earn a grade of “C” or better in each of the required core courses (33 semester credit hours) and in each of the minimum of 15 semester credit hours of courses selected from the list of restricted electives. MSSE majors must earn a grade of “C” or better in a mathematics course chosen from MATH 117, 118, or 126. Students must have an overall grade point average of at least 2.5 for all completed science courses. Students who complete this major will receive a 6 hour waiver of the university requirement that at least half the minimum hours in the major be at the 300- or 400-level.

Students seeking academic advising with regard to preparation as a mathematics or science teacher should contact the SKyTeach office, TCCW 102, (270) 745-3900, or refer to the SKyTeach website – <http://www.wku.edu/skyteach> for additional information.

Upon completing the appropriate certification requirements (including attaining a 2.5 GPA in both majors and overall and the minimum required scores on the appropriate PRAXIS II examinations) the student will be eligible to apply for Kentucky certification for Middle Grades Science, grades 5-9.

Required courses: ASTR 104 or 106; GEOL 111/113, 112/114; BIOL 120/121, 122/123; CHEM 105/106 or 120/121; PHYS 105, 201 or 231/232; SMED 360.

Restricted Electives (Minimum of 15 semester credit hours required, representing at least three of the five science disciplines. Asterisk indicates that another restricted elective is a prerequisite): ASTR 405; GEOL 308, 310, 311, 325, 380, 405; GEOG 427*, 471; BIOL 325, 326, 327, 334, 319/322, 348, 350*, 407, 411/412*, 430*; PHYS 410.

Major in Physics

The major in physics (reference number 754) requires a minimum of 35 semester hours and leads to a Bachelor of Science degree. A minor or second major is required. The foundation for the undergraduate major is provided by a core sequence of six lecture and five laboratory courses, requiring a total of 26 semester hours. This core sequence consists of the following:

- PHYS 180 /181 (4) Introductory Modern Physics and Lab
- PHYS 255/256 (5) University Physics I and Lab
- PHYS 265/266 (5) University Physics II and Lab
- PHYS 301 (1) Electrical Measurements Lab
- PHYS 302 (1) Atomic Lab
- PHYS 321 (3) Introductory Modern Physics II
- PHYS 350 (3) Classical Mechanics I
- PHYS 398 (.5) Junior Seminar
- PHYS 440 (3) Electricity and Magnetism I
- PHYS 498 (.5) Senior Seminar

The student majoring in physics must complete, in addition to this core, a minimum of 9 semester hours of selected upper division departmental courses. The selection is determined by the student’s career aspirations, subject to approval by the student’s departmental advisor. The upper division electives must be chosen from the courses listed for departmental majors and minors, excluding PHYS 389, 399, and 489. No more than 3 hours of PHYS 475 may be counted toward the 35 hour minimum requirement for the major. Support requirements include MATH 136, 137, 307 or 370, 237, and 331, 3 semester hours of CS 146 or higher, and CHEM

Suggested Program of Study: General Physics Track #1			
Fall (freshman year)	Hrs.	Spring (freshman year)	Hrs.
MATH 136	4	MATH 137	4
ENG 100	3	PHYS 255	4
PHYS 180	3	PHYS 256	1
PHYS 181	1	CHEM 120	4
COMM 145 or 161	3	CHEM 121	1
Gen. Ed.	3	HIST 119 or 120	3
Total Hours	17	Total Hours	17
Fall (sophomore year)	Hrs.	Spring (sophomore year)	Hrs.
MATH 310	3	PHYS 321	3
MATH 307 or 370	3	PHYS 301	1
PHYS 265	4	MATH 237	4
PHYS 266	1	CS 240	3
ENG 200	3	CS 244	1
Gen. Ed.	3	Gen. Ed.	3
		Foreign Language-Gen Ed.	3
Total Hours	17	Total Hours	18
Fall (junior year)	Hrs.	Spring (junior year)	Hrs.
MATH 382	3	PHYS 440	3
PHYS 350	3	PHYS 316 or 318	3
PHYS 330	3	PHYS 470	3
PHYS 302	1	PHYS 407	1
MATH 331	3	PHYS 398	0.5
Gen. Ed.	2	MATH 435	3
Gen. Ed.	3	ENG 300	3
Total Hours	18	Total Hours	16.5
Fall (senior year)	Hrs.	Spring (senior year)	Hrs.
PHYS 460	3	PHYS 450	3
PHYS 406	1	PHYS 445	3
PHYS 441	3	MATH 429	3
PHYS 404	1	MATH 450	3
PHYS 480	3	MATH 498	1
PHYS 498	0.5	Gen. Ed.	3
MATH 317	3		
Gen. Ed.	3		
Total Hours	17.5	Total Hours	16

120/121. (Support requirements differ for teacher certification; see below.) The department has prepared several career-oriented tracks, which detail relevant departmental electives and additional or departmentally-approved substitute support courses. Advising tracks currently defined within the Bachelor of Science in physics program include the following:

1. The general physics track is designed for those students who wish to pursue careers as physicists or are preparing for graduate study in physics.
2. The applied physics track combines extensive technical knowledge, related problem-solving skills, and computer techniques to prepare students for positions in industrial and governmental laboratories.
3. The physics and astronomy track prepares students for careers in astronomy/space science and for graduate study in these areas.
4. The teacher certification track prepares students for careers teaching physics at the secondary school level. The student must also complete professional education requirements as specified by the School of Integrative Studies in Teacher Education.
5. Dual-degree - physics/applied science/engineering (see below).
6. Other - There are some specified programs such as a suggested pre-medicine curriculum for students wishing to major in physics. Course recommendations for these tracks are available from the departmental office. In all cases, the student must work closely with the departmental advisor from the beginning to plan a program of study that meets departmental and University requirements and that maximizes preparation to meet career goals.

Dual-Degree Option (Physics/Applied Sciences/Engineering)

This is a 3/2 option that requires three years of study at Western Kentucky University and two years at a science/engineering school, leading to two degrees, one in physics and astronomy at Western Kentucky University and one in engineering or applied science. Western Kentucky University has cooperative agreements with a number of partner institutions. Under these agreements a student can pursue his/her studies

at Western Kentucky University for three years, taking courses in general education, mathematics, chemistry, and physics as required for a major in physics. The student then transfers to one of the partner schools for an additional two years of study in an engineering or applied science area of his/her choice. By transfer of credit from the partner school to Western Kentucky University and upon completion of the graduation requirements at Western Kentucky University, the student receives a Bachelor of Science degree in physics from Western Kentucky University. At the end of the fifth year and upon completion of the graduation requirements at the partner school, the student receives a Bachelor of Science degree from the cooperating school.

Minor in Astronomy

The minor in astronomy (reference number 318) requires a minimum of 20 semester hours and is designed to provide a background in astronomy, astrophysics, and planetary science for students from a wide range of backgrounds. Students who intend to undertake graduate work in astronomy should complete a major in physics with a minor in mathematics. A minor in astronomy consists of at least 16 credit hours of required core courses and at least 4 credit hours from the list of restricted electives. The core requirements are ASTR 214 (4 hrs); ASTR 314 (4 hrs); and an introductory sequence of classical physics: PHYS 255/256 and PHYS 265/266 (10 hours); or PHYS 201 and PHYS 202 (8 hours); or PHYS 231/232 and PHYS 332/233 (8 hours). Physics majors must substitute GEOL 111/113 for PHYS 255-256. The actual elective credit hours required for an astronomy minor is dependent upon satisfaction of the university requirement that at least one-half of the credits required for each major or minor be earned in courses numbered 300 and above. The list of restricted electives includes: ASTR 305, 414, PHYS 316, 441/404, 445, 450, 465, GEOL 325, 330, 350, 370, 420 or 465.

Minor in Biophysics

The minor in biophysics (reference number 329) requires a minimum of 18 semester hours. This course sequence is intended to serve students of the life sciences, that is, students of biology, pre-medicine and pre-dental, agriculture, environmental health, psychology, science teaching, environmental engineering, pre-veterinary, pre-pharmacy and pre-optometry. In general, this curriculum treats the physics of life processes and various applications of physics to biology and medicine. (See the Biophysics section in this catalog.)

Required courses: PHYS 231/232, 332/233, and 335 or 337 or 431; and at least 6 hours selected from appropriate physics and/or biology courses approved by a biophysics advisor.

Minor in Physics

The minor in Physics (reference number 435) requires a minimum of 23 semester hours and the following courses: PHYS 180, 255, 265, 321, and a minimum of 9 semester hours selected from the lecture courses under the bulletin heading DEPARTMENTAL MAJORS AND MINORS.

Course Categories

The courses offered by the Department of Physics and Astronomy belong to four categories according to clientele:

1. **Non-Science Majors**
General courses treating a selection of coordinated topics in sufficient depth to be beneficial to the non-science students; 100-level.
2. **Science and Math Majors and Minors**
Introductory courses for science and math students; mainly 200-level.
3. **Education Majors and Minors**
Upper division courses for prospective teachers; 300- and 400-level.
4. **Department Majors and Minors**
Upper division courses for students following the program options of physics, physics education, dual-degree: 300- and 400-level.

Graduate Degree Programs

The Department of Physics and Astronomy offers courses leading to the Master of Arts in Education (physics minor) and Master of Science in Homeland Security Sciences.

Pre-Professional and Interdisciplinary Programs

Pre-Chiropractic

WKU has a 3-year (90 semester hours) curriculum designed to prepare potential candidates for entry into a professional chiropractic college. Prior to application at a chiropractic college, candidates must have earned a minimum of 90 semester hours (including at least 48 semester hours in the courses listed below). The candidate is responsible for ensuring that he or she has met those specific and elective requirements of the school(s) to which they are applying. WKU has an articulation agreement with Palmer College, Davenport, Iowa for preferred admission pending:

1. Application six months in advance of the intended start date
2. Maintenance of a minimum GPA of 2.50 on a 4.0 scale
3. Completion of at least eight courses at WKU and
4. Satisfaction of all other requirements for admission as prescribed in the Palmer College of Chiropractic catalog.

Advisor: Mr. Wayne Mason

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Although the following requirements will meet current admission guidelines for Palmer, most chiropractic programs possess uniform pre-requisites that mirror these requirements. Completion of these pre-requisites will allow you to compete for available spaces in chiropractic programs, but will not guarantee admission into a professional chiropractic college:

- ENG 100 and 300
- BIOL 120/121; and 122/123 or 131
- CHEM 120/121; and CHEM 222/223
- CHEM 340/341; and CHEM 342/343
- MATH 118 (or MATH 116 and 117)
- PSY 100
- PHYS 231/232; II 332/233 [or PHYS 201; PHYS 202/208]

Humanities and Social Sciences: 15 hours of electives selected from literature, sociology, psychology, art, theatre, etc..., in conjunction with your advisor.

Pre-Dentistry

Students planning a career in dentistry should follow the pre-dentistry curriculum at WKU that is basically the same as that outlined for pre-medicine students. All applicants to dental school must take the Dental Admission Test.

It is recommended that students planning a dental career complete the entire four-year curriculum and receive the baccalaureate degree before entering a dental college. A few dental schools will accept students after three years of undergraduate work. One year of satisfactory work in dental school can then be transferred to WKU in order to receive the Bachelor of Science degree.

Students accepted after three years who entered WKU as degree-seeking students prior to the 2005 fall semester or who are pursuing a second baccalaureate degree should file an undergraduate degree program before leaving WKU. All requirements for general education and the core courses for a major and minor must be completed. Courses taken in dental school may then (at the discretion of the department head) be accepted by the major and/or minor departments at WKU allowing the student to receive the bachelor's degree.

Advisor: Dr. Kenneth Crawford

**Website: <http://bioweb.wku.edu/preprof.htm>
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Office 211, Phone: (270) 745-6005 or 745-3696**

Pre-Forestry

Students interested in forestry as a career may enter Western Kentucky University and complete a plan of study comparable to the first two years of a four-year forestry degree program. The program outlined is designed to qualify students to transfer into the forestry program at the University of Kentucky. This program will permit students with grades of "C" or better to transfer to the degree program of Bachelor of Science in Forestry without loss of credits. Students desiring to attend schools other than the University of Kentucky should contact the pre-forestry advisor for specific requirements.

Required courses are: CHEM 105/106, 107/108 or 120/121, 222/223; ENG 100, 300, BIOL 120/121, 222/223, 348; PHYS 101; MATH 116, 117, 119; COMM 145; AGRO 110, 350; SFTY 171; SPAN 101, GEOG 210; CE 160/161; AGECE 360; AGRI 291 and restricted electives.

Advisor: Dr. Martin Stone

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Pre-Medicine

The pre-medicine curriculum has been developed with two objectives in mind. The first objective is to provide the undergraduate student with an academic background that will enable him/her to succeed in the medical school of his/her choice. The second objective is to provide the academic credits to earn the Bachelor of Science degree after four years of study.

During the first two years of undergraduate work, the pre-medicine student should complete the majority of the basic science courses that constitute the minimal prerequisites for entrance into medical school. All science courses require laboratories and are as follows: BIOL 120, 122, 224; CHEM 120, 222, 340, 342; MATH 118 (or MATH 116 and 117), 142; PHYS 231 and 332, or 255 and 265. In addition to the basic science courses, classes should be taken from the University general education requirements.

During the junior and senior years students, with direction from their pre-medicine advisor, should complete courses to constitute a major and a minor in addition to completing the general education requirements for a degree. All applicants to medical school must take the Medical College Admission Test.

It is required that students planning a medical career complete the entire four-year curriculum and receive the Bachelor of Science degree before entering a medical college.

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Pre-Optometry

Students may fulfill pre-optometry requirements at Western Kentucky University and become eligible to submit applications for admission to any of the twenty optometry schools within the United States. These schools vary slightly in their pre-optometry requirements. Students should decide on the college(s) of optometry to which they plan to submit an application for admission and

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arrange their schedules in accordance with the requirements of that particular school. This information is available from the pre-optometry curriculum advisor. The professional optometric program requires four years of study in a school of optometry. This is in addition to the three or more years of pre-optometry requirements. Applicants to all of the optometry schools are required to take the Optometry Admission Test.

The Kentucky Council on Postsecondary Education, through an agreement with the Southern Regional Education Board (SREB) sponsors a contractual optometric training program at the School of Optometry, Indiana University; the School of Optometry, University of Alabama at Birmingham; and Southern College of Optometry, Memphis, Tennessee. The program is open only to students who are legal residents of Kentucky and have completed the pre-optometry curriculum. The financial aid to students consists of the approximate difference in the cost of in-state and out-of-state tuition at the optometry schools for not more than four academic years. Once approved, the student must exhibit satisfactory progress toward completion of the prescribed four-year curriculum and apply to the Council each year for continuation in the SREB program. However, an approved student making normal academic progress is re-certified annually upon application. This program provides for not more than three new students each year at the University of Alabama at Birmingham, three at the Indiana University and eight at Southern College of Optometry.

At the time they apply to optometry school, students should also file an application with the Council on Postsecondary Education for certification to participate in the SREB program. Both acceptance for admission by the college of optometry and certification by the Council are required for Kentucky student aid in the program. The optometry schools reserve the right to select students acceptable to the program. Since the program is designed to provide funds (or financial support) for a limited number of students each year at the three schools of optometry and is funded accordingly by the General Assembly, Kentucky students planning careers in optometry should not limit their plans for training to these institutions. Kentucky students in optometry are presently enrolled and will continue to enroll at several excellent schools and colleges other than Indiana University, the University of Alabama and Southern College of Optometry. This program of student assistance, however, is limited to these three institutions.

The courses listed below are required as prerequisites for all optometry schools. Each science course must be accompanied by its appropriate laboratory: BIOL 120, 122, 224; CHEM 120, 222, 340; PHYS 231, 332 or 255, 265; MATH 118 (or MATH 116 and 117), 142; ENG 100, 300; PSY 100 and a course in statistics. There are additional course requirements that vary with each optometry school. All students in the curriculum are strongly encouraged to work toward a Bachelor of Science degree, even though a degree is not required for admission to most optometry schools.

Pre-Pharmacy

Students planning a career in pharmacy may follow a pre-pharmacy curriculum at WKU for two years, then transfer to a school of pharmacy for the remaining four years of training.

The following curriculum contains courses required for admission to the University of Kentucky College of Pharmacy. The courses required by other schools of pharmacy are much the same; however, the student should investigate the requirements of the school to which that student plans to transfer in order that every requirement may be included in the pre-pharmacy program.

Freshman year: BIOL 120, 121, 131; CHEM 120, 121, 222, 223; ENG 100; MATH 136; electives.

Sophomore year: BIOL 207, 208; CHEM 340, 341, 342, 343; ECON 202; ENG 300; PHYS 231, 232, 332, 233; MATH 183; electives.

Electives should include one course in either geography, psychology or sociology. COMM 145, HIST 119 or 120 is also recommended.

The Carpenter-Dent Trust Fund offers scholarships to eligible pre-pharmacy students who are residents of Allen, Simpson or Warren County.

Pre-Podiatric Medicine

Students planning a career in podiatry should follow the pre-podiatric curriculum at Western Kentucky University that is basically the same as that outlined for pre-medicine students. All applicants to podiatry school must take the Medical College Admission Test.

Three years of undergraduate academic study are required;

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however, it is recommended that students planning a career in podiatry complete the entire four-year curriculum and receive the Bachelor of Science degree before entering a college of podiatric medicine.

Pre-Physical Therapy

The pre-physical therapy program at Western Kentucky University is designed to prepare students for application to accredited programs in physical therapy exist.

Currently, it is recommended that the student complete a baccalaureate degree while completing the pre-requisite requirements of the physical therapy schools to which they plan to apply. It should be noted that most physical therapy schools have switched to Doctorate/PhD level programs, and as a result, the pre-requisites may be slightly different from what is listed below. Although the program was originally established to follow the prerequisite guidelines for physical therapy schools in Kentucky, enough flexibility exists to allow modification of the curriculum to meet the requirements of physical therapy programs in other states. Completion of the following prerequisites does not guarantee admission into a physical therapy school; it merely places the candidate into a competitive pool of applicants from which the successful candidates will be selected and interviewed.

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Application to the physical therapy schools at WKU, the University of Kentucky (a doctoral program) and Bellarmine University (a doctorate level program) requires applicants to have earned a bachelor's degree by the time they enter the program. A grade of "C" or better is required in all prerequisite courses. Applicants must also show evidence of having completed at least 50 hours of physical therapy observation and/or volunteer experience at 2 or more health care facilities. The following requirements must be completed by the time the successful applicant enters the professional program:

I. General Education Requirements

- 2 semesters of English composition: ENG 100 & 300
- 1 semester of Literature: ENG 200
- 1 semester of Humanities (fine or performing arts): ART 100; or THEA 151; or MUS 120
- 1 semester of Speech Communication (COMM 145 or 161)
- 2 semesters of Psychology: PSY 100 & PSY 199
- 1 semester of History (Western Civilization): HIST 119 or 120
- 1 semester of cross-cultural studies (ANTH 120 or 200; FLK 350; or HIST 110 or 360; or RELS 320)
- 1 semester of introductory philosophy; PHIL 110
- 1 semester of ethics: PHIL 320 or 322
- 1 semester of health and safety: SFTY 171
- 2 semesters of Foreign Language

II. Math/Science requirements

- BIOL 120/121; 122/123; [BIOL 224/225; 321 and 330/331 are strongly recommended for UK applicants)
- BIOL 131 and 231 (recommended for Bellarmine University, but not required for UK)
- CHEM 120/121; 222/223
- PHYS 231/232; 332/233 [or 201/207; 202/208]
- MATH 118 or (116 and 117) (MATH 136 is recommended for the University of Kentucky)
- Statistics: BIOL 283 or [any one of the following: PH 383 or MATH 183]
- Medical terminology: AH 290

The GRE is also required and should be completed by mid-April of the application year for UK; by mid-October for Bellarmine. It is also strongly recommended that professional certification in first aid by the American Red Cross and in CPR by the American Heart Association be completed prior to entrance into the program. The community CPR course offered by the American Red Cross is NOT acceptable.

Minimum overall GPA should be 2.75; minimum science core GPA should be 3.0 (4.0 scale). However, the competitive nature of the application process over the last several years indicates that overall and science GPA's should both be 3.4 or higher to seriously contend for entrance.

Pre-Veterinary Medicine

Kentucky students have the opportunity to enter veterinary medical school at Auburn University, Auburn, Alabama or Tuskegee Institute, Tuskegee, Alabama. The Commonwealth of Kentucky has made this possible through its participation in the Southern Regional Education Program. The State of Kentucky pays approximately \$22,400 annually for each student at Auburn or Tuskegee. Each year the School of Veterinary Medicine at Auburn reserves 34-40 positions for entering students from Kentucky who meet admission requirements of the school. If admitted, Kentucky students do not pay out-of-state tuition, but pay the same fees as Alabama residents. Two to six positions may also be available each year at Tuskegee Institute on the same basis. The positions at both Auburn and Tuskegee are awarded by the selection committees of the two respective universities.

The minimum education requirement for admission to the School of Veterinary Medicine, Auburn University, is the satisfactory completion of an approved curriculum at an accredited college or university. A minimum grade point average of 2.50 is required overall and for the required courses.

Students may apply to one or both institutions as they near completion of the pre-veterinary requirements. The GRE is required for both Auburn University and Tuskegee.

The following courses have been approved by Auburn University; ENG 100, 200, and 300; MATH 116 and 117 or higher level; HIST 119 and 120; CHEM 120/121 and 222/223, 340 and 341, 342 and 343; PHYS 231 and 232, 332 and 233; BIOL 120 and 121, 122 and 123; ANSC 345; BIOL/CHEM 446; ART 100, MUS 120, or THEA 151; COMM 161; and 6 hours of 300-400 level science electives; 6 hours social science elective; and 6 hours of humanities/fine arts electives. This curriculum is planned for completion in three years. It is possible to complete requirements in less time by attending summer school sessions, but due to difficulty of the curriculum, it is not normally advisable. By choosing the correct electives in the pre-veterinary program and transferring credits for the first year of veterinary school to Western Kentucky University, students may receive the bachelor of science degree in agriculture from Western Kentucky University. This is a suggested curriculum; the sequence of courses may be varied to suit individual situations. Every effort is made to advise each student based upon the individual's background and academic capability.

Approved curricula for other Schools of Veterinary Medicine are also available.

Biochemistry

Biochemistry is the study of the chemical basis of living organisms. The subject includes the investigation of the various classes of biomolecules (proteins, nucleic acids, lipids, and carbohydrates) and their metabolic interactions.

Training in biochemistry offers many exciting opportunities in teaching, research and public service. It provides excellent preparation for students intending to enter professional programs such as Dentistry and Medicine as well as graduate study in Biochemistry, Chemistry or Biology. The Biochemistry program is the only stand-alone degree program (B.S.) in Biochemistry at public institutions in the Commonwealth. It is administered jointly through the Departments of Biology and Chemistry. Students may enroll for biochemistry courses through either the Department of Biology or the Department of Chemistry depending upon their major emphasis.

Biochemistry I (BIOL/CHEM 446) is strongly recommended for pre-medicine and pre-dentistry students as well as for chemistry and biology majors.

Major in Biochemistry

The major in biochemistry (reference number 519) requires a minimum of 60 semester hours and leads to a Bachelor of Science degree. This sequence of required chemistry and biology courses along with elective courses from biology, chemistry, agriculture, and physics offer the student a unique opportunity for interdisciplinary training.

Required courses are CHEM 120, 121, 222, 223, 330, 340, 341, 342, 343; BIOL 120, 121, 122, 123, 319, 322, 411; BIOL/CHEM 446, 447, 467.

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Advisors:

**Dr. Sigrid Jacobshagen, Department of Biology
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Phone: (270) 745-5994**

**Dr. Kevin Williams, Department of Chemistry
Thompson Complex, North Wing, Office 329
Phone: (270) 745-8899**

**Dr. Rajalingam Dakshinamurthy
Thompson Complex, Central Wing, Office 353
Phone: (270) 745-2136**

Faculty:

Department of Chemistry: L. Byrd,
R. Dakshinamurthy, K. Williams

Department of Biology: S. Jacobshagen, N. Rice,
C. Rinehart

In addition to the required courses, students are expected to complete elective courses to total a minimum of 60 semester hours.

Electives: BIOL 222, 223, 224, 225, 226, 227, 327, 328, 330, 331, 350, 399, 400, 404, 407, 412, 420, 430, 440, 450, 475, 495, 496

Electives: CHEM 320, 399, 420, 430, 435, 412 or (450, 451, 452, 453), 462, 475.

Electives: Agriculture courses 320, 344, 345, 350, 351, 352, 399, 409, 410, 437, 438, 448, 452, 455, 456.

Electives: PHYS 335, 431

In addition to the above 60 semester hours, the student is required to take PHYS (231, 232, 233, 332) or (255, 256, 265, 266) and MATH 136.

Minor in Biochemistry

The minor in biochemistry (reference number 324) requires a minimum of 18 semester hours and a major in either chemistry or biology. Required courses are BIOL 411; BIOL/CHEM 446, 447, 467.

Electives: BIOL 120, 121, 226, 227, 319, 322, 327, 330, 331, 400; CHEM 120, 314 or (340, 341, 342, 343), 420, 462, 435; Agriculture 437, 438, 448.

Any course used in the student's major cannot be counted toward the biochemistry minor.

Biophysics

Biophysics deals with the physics of life processes and treats various applications of physics to biology and medicine. It combines a working knowledge of physical theory with an appreciation of the complexities of biological processes. Although only recently established as a separate discipline, it has rapidly taken position alongside those fields that are advancing the frontiers of scientific knowledge.

The minor in biophysics (reference number 329) serves students of the life sciences: agriculture, biology, environmental engineering, environmental health, medical technology, pre-dentistry, pre-medicine, pre-optometry, pre-pharmacy, pre-veterinary and psychology.

Goals of the biophysics minor: The purpose of the biophysics minor is to prepare students to meet the career goals listed below. It is expected that a student completing this minor will be proficient in the use of biological instruments and will understand the underlying physical theory. In addition, the student will be exposed to two fundamental ways of looking at biology; first, from the point of view of the biologist who understands the complexity of life processes and second, from the point of view of the physicist who appreciates the basic simplicity of all the laws of nature.

Career Opportunities: The applicability of biophysics is so widespread that we can only outline some of the career opportunities. Medical doctors, dentists, pharmacists, optometrists, veterinarians, many researchers in the life sciences, physical therapists and nurses require an understanding of the principles and techniques involved in the use of modern instruments. Radiation treatment, CAT scanning, genetic engineering, nanodevices, laminar flow rooms, cryosurgery and artificial organs have all been made possible due to rapid advances in biophysics.

Biophysics provides a helpful background for students interested in professional training in health related fields. It is also a valuable area for students interested in teaching biology or health at any level. Industrial, government or university laboratory work requires a thorough knowledge of both the theory and application of modern instrumentation. The federal government is currently funding training programs that combine biology and physics. Job opportunities are available for students with such a background and these openings are expected to increase over the next few decades.

Requirements: Students will be admitted into the program by the biophysics advisor. Individual counseling will guide the students to a proper choice of courses consistent with previous experience. Introductory Biophysics (PHYS 231, 332) requires high school algebra and geometry. The more advanced courses will require knowledge of 231 and 332. Additional mathematical training is encouraged.

The biophysics minor consists of a minimum of 18 credit hours. Required courses are PHYS 231/232 Introduction to Physics and Biophysics I with laboratory, 4 hours; PHYS 332/233 Introduction to Physics and Biophysics II with laboratory, 4 hours; PHYS 335 General Biophysics, PHYS 337 Medical Imaging, or PHYS 431 Radiation Biophysics, 4 hours, or another upper level Biophysics course. Optional courses (minimum of 6 hours required) include but are

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Faculty:

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W. Van der Meer

Department of Biology: K. Crawford,
S. Jacobshagen

Department of Chemistry: K. Williams

not limited to the following: BIOL or PHYS 399 Research Problems, 1-3 hours; BIOL 330 Animal Physiology, 3 hours; BIOL 331 Animal Physiology Laboratory, 1 hour; BIOL 404 Electron Microscopy, 3 hours; BIOL 411 Cell Biology, 3 hours. Each student will meet with the biophysics advisor to determine which of these or additional courses should be taken to complete a minor. Descriptions of biology and physics courses are found elsewhere in this catalog.

Medical Technology

With the aging of our population, it is estimated that health care will be a major service industry in our country. An important part of health care is medical technology or clinical laboratory scientists, a profession that includes well-trained, highly educated individuals who are the fact-

finders of the medical world. Medical technologists (Clinical Laboratory Scientists) typically analyze body fluids, examine tissues, and identify specific microorganisms to find evidence for and the cause of specific diseases such as AIDS, Diabetes, and Cancer. Some of the exciting new demands of the profession include tissue typing for organ transplantation, chromosomal studies as a basis for genetic counseling, identification of environmental

pollutants, and screening tests for accidental poisoning and drug abuse. The demand for Medical Technologists is very high. The U.S. Bureau of Labor Statistics continues to project a need for new Medical Technologists to meet medical demands of an aging population.

Although two-thirds of medical technologists work in hospital laboratories, new sources of employment include laboratories in physician's offices, research facilities in universities and industries, public health centers and in veterinary clinics.

The medical technology program (reference number 582) combines a minimum of three years (96 semester hours) of college courses at Western Kentucky University with a minimum of 12 calendar months (36 semester hours) of satisfactory clinical training in a school of medical technology. This school must be approved by the Committee on Allied Health Education and Accreditation of the American Medical Association and by the medical technology coordinator at Western Kentucky University.

Coursework for this major requires a minimum of 60 hours in Biology (36 of which are completed at a Medical Technology school and transferred back to the Department of Biology), 20 hours of Chemistry, and 5 hours of Mathematics which leads to a B.S. degree in Medical Technology. No minor is required. A student must meet all of the general education requirements for the bachelor's degree at Western Kentucky University before admission to the school of medical technology. Upon satisfactory completion of the course requirements in medical technology, the Bachelor of Science degree will be awarded by Western Kentucky University. Graduates of the medical technology program are eligible to take national credentialing examinations for medical technologists which result in membership in the American Society of Clinical Pathologists (A.S.C.P.). The program is affiliated with the following schools of medical technology: Bellarmine University, Louisville, KY; Owensboro-Daviess Co. Hospital, Owensboro, KY; Vanderbilt Medical Center, Nashville, TN; and St. Elizabeth Medical Center, Covington, KY.

Advisor: Dr. Kerrie McDaniel

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Suggested Program of Study for Medical Technology										
	Semester	Biology Courses	Chemistry Courses	Category A	Category B	Category C	Category D	Category E	Category F	Total
Freshman Year	1 st semester	120/121 And/Or 122/123		ENG 100		HIST 119/120	MATH 118 or higher			16
	2 nd semester	120/121 Or 122/123 Or 224/225	120/121	Foreign Language		3 hrs	BIOL and CHEM Courses fulfill this require- ment		Elective 1 hr*	16
Sophomore Year	3 rd semester	224/225 Or 226/227	222/223	Public Speaking	Literature (Eng 200)					16
	4 th semester	226/227 Or 319/322	314						Elective 1 hr*	12
Junior Year	5 th semester		330	ENG 300	3 hrs			Elective 3 hrs.		14
	6 th semester	328			3 hrs	3 hrs				9
Senior Year	7 th and 8 th semester	Semester hours transferred to WKU from Affiliated School of Medical Technology								36
	Semester hours	24	20	12	9-12	12	12	3	2-3	119**

* Two 1 hr electives or PH 100 or 165 (3 hrs)

** A total of 120 semester hours are required for graduation. It is highly suggested you pick the remaining electives from the suggested elective course list.

Course requirements at Western Kentucky University include BIOL 120-121, 122-123, 224-225, 226-227, 319-322, BIOL 328; CHEM 120-121, 222-223, 314, 330, CS 145 or 146 and MATH 118 or MATH 116 and 117.

More detailed information including general education requirements can be obtained from the coordinator. Students must consult the coordinator regarding applying for admission to the medical technology schools. Application is made 9 to 12 months in advance of the beginning date for the medical technology school. Admission to these schools is on a competitive basis, and maintenance of a good academic standing is required. Students are required to have liability insurance for their clinical years.

Aerospace Studies (AFROTC)

The Air Force Reserve Officers Training Corps (AFROTC) provides precommission training for college men and women who desire to serve as commissioned officers in the United States Air Force. When combined with the academic disciplines offered at the college level, the program provides the student a broad-based knowledge of management, leadership, and technical skills required for a commission and subsequent active duty service in the Air Force. A minor in aerospace studies (reference number 304) is now available to students. Contact the aerospace studies advisor for course requirements.

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e-mail: Andrew.Ernest@wku.edu

Graduates are commissioned as Second Lieutenants and are called to active duty within 60 days. Educational delays may be granted for non-flying graduates who desire to pursue advanced degrees prior to entry on active duty. The main objectives of producing officers through the AFROTC program are:

1. To procure officers with a broad educational base.
2. To provide a basic military education for college students.
3. To teach fundamentals and techniques of leadership, management and decision-making.
4. To develop, in conjunction with other academic disciplines, individual character and attributes required of a commissioned officer in the United States Air Force.

Air Force ROTC Program

How do I enroll?

In cooperation with Tennessee State University, located in Nashville, TN, an opportunity is available for Western Kentucky University (WKU) students to participate in the Air Force ROTC Program. Simply call the detachment (615.963.5931) and ask for a Cross-Town Application. Mail this short application and your unofficial transcripts with your immunization records back to Detachment 790. The program provides training and education that will develop skills and attitudes vital to the professional Air Force Officer. In this program students are eligible to compete for scholarships (2.5+ GPA) and receive the same benefits and privileges as full-time students enrolled at TSU. In addition to the above, Western Kentucky University grants two room and board scholarships each year to winners of four-year or three and one-half year AFROTC scholarships.

Curriculum - The General Military Course (GMC) is 1 credit hr and is composed of the first four semesters of aerospace studies (AERO) and is for freshmen and sophomores. The Professional Officer Course (POC) is 3 credit hrs and constitutes the final four semesters of AFROTC study and enrolls juniors and seniors.

Civil Air Patrol Squadron - A centralized flying program for AFROTC cadets conducted at any time while they are enrolled in AFROTC. Training consists of eight hours of flying instruction in a light, single-engine aircraft. Objectives of the program are to train and motivate qualified cadets toward a rated (flying) career, and to introduce the cadets to the aviation career field.

Students who participate in the Air Force ROTC program must be enrolled as a student at WKU (or other cross-town college). The student is also jointly enrolled as a TSU student and participates in Aerospace Studies at TSU. For more information, contact the Unit Admissions Officer at (615) 963-5977 or check the website at www.tnstate.edu/rotc or www.afrotc.com.

Field Training

Six-week Field Training Course: This course is designed to qualify the student who has not had GMC courses for enrollment into the POC (AERO 351). Primarily, it enables students who are unable to enroll in the GMC an opportunity to pursue the advanced course and thereby receive a commission in two years of study, coincident with the conferral of the baccalaureate degree.

Four-week Field Training Course: This course is designed for the cadet who has completed the entire GMC coursework and Leadership Lab. The four-week Field Training Course prepares the cadet for enrollment into the POC. This would include prior enlisted members.

Both: These courses constitute the cadets first extended exposure to an actual Air Force environment. Activities include survival training, junior officer training, aircraft and aircrew indoctrination, physical training, career orientation,

small arms familiarization, first aid training and a first-hand look at the organization and functions of an active Air Force base.

POC Eligibility

The following are prerequisites for entry into the AFROTC Professional Officers Course (POC). The student must:

1. Have either completed the General Military Course (GMC) or the six-week Field Training Course. The GMC may be accredited for certain prior military service applicants who meet specific criteria.
2. Have two academic years of college remaining (either undergraduate, working on second degree, or graduate degree) as a full-time student.
3. Have achieved a qualifying score on the AFOQT.
4. Execute a written agreement to complete the program and successfully complete the applicable Field Training Course and accept an Air Force Reserve Commission, when tendered.
5. Be selected by the Professor of Aerospace Studies (PAS).
6. Meet certain specified age requirements.

General Benefits

All students enrolled in the AFROTC programs are provided textbooks and uniforms at no expense. POC students (juniors and seniors) and all scholarship students receive a monthly subsistence allowance of up to \$400 tax-free. Those cadets who attend Field Training are also paid air travel to and from the encampment, plus a stipend based on current active duty pay scales (approximately \$450-\$650).

Sponsored Activities

Arnold Air Society - A national society of AFROTC cadets who excel in character, academics, and exhibit interests in the study of aerospace technology meets at TSU.