

# Degree Programs

UMR offers Bachelor of Science, Bachelor of Arts, Master of Science, Master of Engineering, Doctor of Philosophy, and Doctor of Engineering degrees. You can major in engineering, science, business, or the liberal arts. You can get a background for law or medicine or other professional studies.

In many disciplines there are emphasis areas which are areas of concentration within a degree program. If you choose an emphasis area, you will take some of your elective hours in specified courses in that area. Your advisor can guide you toward the election of courses you should take if you choose an emphasis area.

Listed below are the Bachelor degrees and their emphasis areas:

## College of Arts & Sciences

- applied mathematics (emphasis areas in actuarial science, algebra/discrete mathematics, applied analysis, computational mathematics, statistics)
- biological sciences (pre-medicine)
- chemistry (emphasis areas in biochemistry, polymer and coatings science, and pre-medicine chemistry)
- computer science
- English
- history
- philosophy
- physics (emphasis areas in applied physics, geophysics)
- psychology (emphasis areas in human services, human resources/ personnel, research psychology, sports psychology, usability of technology)
- Teacher Education Program (Secondary Education Certification)

## School of Engineering

- aerospace engineering
- architectural engineering (emphasis in structural engineering, construction engineering and project management, environmental systems for buildings, and construction materials)
- chemical engineering (emphasis in biochemical engineering)
- civil engineering (emphasis areas in construction engineering, environmental engineering, geotechnical engineering, materials engineering, structural engineering, transportation engineering, water resources engineering)
- computer engineering
- electrical engineering (emphasis areas in circuits, communications-signal processing, computer engineering, control, electromagnetics, electronics, power,
- engineering management (emphasis areas in industrial engineering, management of technology, manufacturing engineering, packaging engineering, quality engineering)
- environmental engineering
- mechanical engineering (emphasis areas in control systems, energy conversion, environmental sys-

tems, instrumentation, manufacturing processes, materials science, mechanical design and analysis, thermal science)

## School of Management and Information Systems

- business and management systems (emphasis areas in business administration, management information systems)
- economics (emphasis area in economics/business) (business administration-cooperative program with the University of Missouri-Columbia)
- information science and technology

## School of Materials, Energy, and Earth Resources

- ceramic engineering
- geological engineering (emphasis areas in engineering geology and geotechnics, environmental protection and hazardous waste management, groundwater hydrology and contaminant transport, petroleum, energy and natural resources, and quarry engineering)
- geology & geophysics (emphasis areas in geochemistry, geology, geophysics, groundwater & environmental geochemistry, and petroleum geology)
- metallurgical engineering (emphasis areas in chemical metallurgy, manufacturing metallurgy, physical metallurgy)
- mining engineering (emphasis areas in explosives engineering, quarry engineering, coal, mining and the environment, mining health and safety, sustainable development )
- nuclear engineering
- petroleum engineering (emphasis areas in reservoir characterization, energy industry management, and information technology).

## Minors

You can elect to combine a recognized minor program with your bachelor of arts or bachelor of science degree programs in the following areas:

- accounting and finance
- aerospace engineering
- american studies
- applied mathematics
- art
- bioinformatics
- biological sciences
- business economics
- business and management systems
- chemistry
- communication studies
- computer science
- economics
- energy/technology
- film and literature

- financial economics
- French
- geological engineering
- geology
- German
- history
- industrial/organizational psychology
- information science and technology
- international economics
- leadership communication
- literature
- literature and film
- materials
- mathematics
- military science
- mining engineering
- music
- nuclear engineering
- petroleum engineering
- political science
- philosophy
- physics
- pre-medicine
- psychology
- psychology of leadership
- Russian
- science, technology, and politics
- sociology
- Spanish
- technical writing
- writing

## Bachelor of Arts Degree

### General Requirements

This degree can be earned in the following areas: biological sciences, chemistry, economics, English, history, philosophy, and psychology.

In the College of Arts and Sciences, a minimum of 120 credit hours is required for a Bachelor of Arts degree with an average of at least two grade points per credit hour to be obtained. At least 45 hours of the student's work must be taken of the upper-class (course numbered 200 or above) level.

Requirements for the Bachelor of Arts degree follow:

#### I. Basic Skills and Concepts <sup>(a)</sup>

- A) Composition: English 20 and one additional three hour composition course<sup>(b)</sup> 6 hrs.
- B) Western Civilization (History 111 and 112) 6 hrs.
- C) Foreign languages<sup>(c,d)</sup> approximately 11-16 hrs.
  - 1) At least three semesters of basic study in French, German, Russian, Spanish, or an approved substitute.
  - 2) One year of basic study in one foreign language, either French, German, Russian, Spanish, or an approved substitute, and a humanities or social sciences course taught in a foreign country and employing the language of that country.

- 3) One year of basic study in each of two foreign languages; French, German, Russian, Spanish, or an approved substitute.

### II. General Education Requirements

- A) Sciences (12 hrs.): At least one course taken in each of the biological (Biological Sciences), physical (chemistry, geology and geophysics, and physics), and mathematical<sup>(d)</sup>(mathematics/ statistics and computer science) sciences, but not to include Math 1 or Cmp Sc 1. A laboratory offered in the Schools of Engineering or Mines and Metallurgy also may count – at the discretion of the student's major department – toward the total requirement.
- B) Humanities (12 hrs.): At least one course in each of the three areas of literature (English and American), philosophy, and fine arts (art, music and theater), but not to include studio and performance offerings. This requirement is exclusive of courses in the student's major field.
- C) Social Sciences (12 hrs.): Courses in at least two of the following areas: economics, political science, psychology, and sociology. This requirement is exclusive of courses in the student's major field.

### III. Major Field Requirements

- A) Specific major field requirements in each discipline are given in the entry of that discipline.
- B) A cumulative grade point average of 2.0 must be earned in all course work taken in the major field. Upper-class (200- and 300-level) courses completed with grades of "D" may not be included in the major field without the approval of the chairman of the department concerned.
- C) At least nine hours of upper-class work in the major field must be completed in residence at UMR.

### IV. Minor Field Requirements

- A) Specific minor field requirements in each discipline are given in the entry of that discipline.
- B) A cumulative grade point average of 2.0 must be earned in all course work required in the minor field.
- C) A least six hours of work in the minor field must be completed in residence at UMR.

### V. Elective Credits

- A) In consultation with his or her advisor, each student will elect sufficient additional courses to complete a minimum of 120 credit hours.
- B) Basic ROTC (military science and aerospace studies) may be taken in the freshman and sophomore years. Up to 12 credit hours (depending on the student's major) of advanced courses in ROTC may be credited toward a degree.

### Notes

<sup>(a)</sup> For transfer students these requirements may be met by equivalent course work completed at other institutions.

<sup>(b)</sup> This requirement cannot be satisfied with English 10 or 11: English as a Second Language. An entering

student may quiz out of English 20: Exposition and Argumentation (3 hrs) on the basis of Advanced Placement standing, through various examinations offered by the College-Level Examinations Program (CLEP subject exams) through the UMR placement examination program based on Missouri College English Test (MCET) and Cooperative School and College Ability Test (SCAT) scores.

- (c) This requirement cannot be satisfied through foreign civilization courses which are taught in English. A student who has studied French or Spanish prior to enrolling in courses at UMR will be required to take a placement exam that will determine the appropriate course for his/her level of preparation. Students may not enroll in or receive credit for a course taken below their placement level. All course placement requires instructor's approval.

A student may receive foreign language credit by examination with a score of 3,4, or 5 on the language or literature AP exam or with a score in the 75th percentile or above on the CLEP exam.

- (d) Upon approval of the Dean of the College of Arts and Sciences students seeking teacher certification may substitute 11-16 hours of certification courses for their foreign language requirement. Students electing to make this substitution must complete the certification program to receive their chosen Bachelors of Arts degree.
- (e) The mathematics/statistics requirement may be satisfied by (1) examination or (2) the presentation of 2.5 high school units, including 1.5 units of algebra and excluding general mathematics. The student will not, however, receive hour credit so he or she must take another course to fulfill the 12 hours.

## VI. General Education Communications Requirements

Each department will provide students with opportunities to enhance their writing and speaking skills (beyond the required English 20 class) by requiring that they complete at least two Communications Intensive courses, at least one of which should be in the student's major. Communication Intensive (CI) courses may be focused on writing, speaking, or combinations thereof. Two Communications Emphasized (CE) courses may be used at the equivalent of one CI course (for example, four CE courses would substitute for two CI courses, but an appropriate substitute for the one CI course in the student's major). These requirements will be formally tracked and monitored by the CAPS advising system to ensure that each graduating student is meeting the Communications component of the General Education requirement.

# Bachelor of Science Degree

## College of Arts and Sciences

### (General Requirements)

This degree can be earned in the following areas: applied mathematics, chemistry, computer science, biological sciences, physics, and psychology.

In the College of Arts and Sciences, a minimum of 124 credit hours is required for a Bachelor of Science degree and an average of at least two grade points per credit hour must be obtained. These requirements for the B.S. degree are in addition to credit received for algebra, trigonometry, and basic ROTC. An exception to the requirement occurs in biological sciences and psychology which include credit for algebra and trigonometry (Math 2 or 4 and 6) as part of the 124-hour requirement.

In general, each science curriculum requires twelve semester hours in humanities, exclusive of foreign language, and must include English 60 or English 160. A minimum of nine semester hours is required in social sciences, including either History 175, 176, 112, or Pol Sc 90 or 176. Specific requirements for the bachelor degree are outlined in the sample program listed by each department offering this degree.

### General Education Communications Requirements

Each department will provide students with opportunities to enhance their writing and speaking skills (beyond the required English 20 class) by requiring that they complete at least two communications Intensive courses, at least one of which should be in the student's major. Communication Intensive (CI) courses may be focused on writing speaking, or combinations thereof. Two Communications Emphasized (CE) courses may be used at the equivalent of one CI course (for example, four CE courses would substitute for two CI courses, but two of the CE courses must be in the student's major as an appropriate substitute for the one CI course in the student's major). These requirements will be formally tracked and monitored by the CAPS advising system to ensure that each graduating student is meeting the Communications component of the General Education requirement.

# Bachelor of Science Degree

## School of Engineering

### (General Requirements)

This degree can be earned in the following areas: aerospace engineering, architectural engineering, chemical engineering, civil engineering, computer engineering, electrical engineering, engineering management, environmental engineering, and mechanical engineering.

Entering freshmen desiring to study engineering will be admitted to the Freshman Engineering Program (see page 164). They will, however, be permitted, if they wish, to state a departmental preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the program is on enhanced advising and career counseling, with the goal of providing to the student the information necessary to make an informed decision regarding the choice of an engineering major.

For the Bachelor of Science degree in the School of Engineering a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. At least two grade points per credit hour must also be attained in all courses taken in the student's major department.

Each student's program of study must contain a minimum of 21 credit hours of course work in general education and must be chosen according to the following rules:

- 1) All students are required to take one American history course, one economics course and English 20. The history course is to be selected from History 112, History 175, History 176, or Political Science 90. The economics course may be either Economics 121 or 122. The humanities course must be selected from the approved lists for Art, English, Foreign Languages, Music, Philosophy, Speech and Media Studies, or Theater.
- 2) Depth requirement. Three credit hours must be taken in humanities or social sciences at the 100 level or above and must be selected from the approved list. This course must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 70 or 80 will be considered to satisfy this requirement. Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 300 level. All courses taken to satisfy the depth requirement must be taken after graduating from high school.
- 3) The remaining two courses are to be chosen from the list of approved humanities/social sciences courses and may include one communications course in addition to English 20.

- 4) Any specific departmental requirements in the general studies area must be satisfied.
- 5) Special topics and special problems and honors seminars are allowed only by petition to and approval by the student's department chairman and dean.

The engineering programs at UMR are characterized by their focus on the scientific basics of engineering and their innovative application; indeed, the underlying theme of these educational programs is the application of the scientific basics to engineering practice through attention to problems and needs of the public. The necessary interrelations among the various topics, the engineering disciplines, and the other professions as they naturally come together in the solution of real world problems are emphasized as research, analysis, synthesis, and design are presented and discussed through classroom and laboratory instruction.

#### FREE ELECTIVES FOOTNOTE:

Free electives. Each student is required to take six hours of free electives in consultation with his/her academic advisor. Credits which do not count towards this requirement are deficiency courses (such as algebra and trigonometry), and extra credits in required courses. Any courses outside of Engineering and Science must be at least three credit hours.

### Accreditation

Missouri law requires that all applicants for registration as professional engineers be graduates of engineering programs accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET) or possess an education which includes at the minimum a baccalaureate degree in engineering and which, in the opinion of the registration board, equals or exceeds the education received by a graduate of a program accredited by EAC/ABET.

All UMR bachelor's level engineering programs are ABET accredited except Architectural, and Environmental Engr., which are new programs. Applicants who receive advanced degrees from UMR engineering programs, but do not have undergraduate engineering degrees, may not be eligible for registration in Missouri. Such applicants may wish to consider studying toward a bachelor's degree in their chosen engineering field. If so they should consult with their department chairman regarding specific requirements. All eligible graduates are strongly encouraged to seek professional engineer registration.

### General Education Communications Requirements

Each department will provide students with opportunities to enhance their writing and speaking skills (beyond the required English 20 class) by requiring that they complete at least two Communications Intensive courses, at least one of which should be in the student's major. Communication Intensive (CI) courses may be focused on writing, speaking, or combinations thereof. Two

Communications Emphasized (CE) courses may be used as the equivalent of one CI course (for example, four CE courses would substitute for two CI courses, but two of the CE courses must be in the one CI in the student's major). These requirements will be formally tracked and monitored by the CAPS advising system to ensure that each graduating student is meeting the Communications component of the General Education requirement.

## **Bachelor of Science Degree School of Management and Information Systems (General Requirements)**

This degree can be earned in the following three areas: business and management systems, economics and information science and technology.

In the School of Management and Information Systems, the Bachelor of Science degrees consist of 120 credit hours. Of the 120 credit hours, 93 credit hours are common to all bachelor degrees. First, all undergraduate students in the school are required to complete a prescribed General Education Requirements Core that corresponds to the recommendations of the Missouri State Coordinating Board for Higher Education and consists of 42 credit hours in the areas of Individual Expression, Natural Systems, and Human Institutions. In addition, all undergraduate students are required to complete a 39 credit hour School of Management and Information Systems Core consisting of courses in Information Technology, Management, Quantitative Skills, and Communication Skills. A minimum grade of "C" is required for courses in both the Information Technology and the Management areas. Finally, each degree includes 12 credit hours of free electives.

The remaining 27 credit hours of the required 120 credit hours for each degree are divided into a prescribed 18 credit hour degree core and 9 credit hours of specific degree electives. A minimum grade of "C" is required in these courses. The Business and Management Systems Degree requires courses in Marketing, Finance, Operations, Human Resources, Strategic Management, and Statistics. The electives for this degree are then chosen from the two emphasis areas of Business Administration or Management Information Systems. The Economics Degree requires courses in advanced Micro, Macro and Statistics. The electives for this degree consist of courses from areas such as Law and Economics, Money and Banking, Energy Economics and E-Commerce. The Information Science and Technology Degree requires courses in Database Management, Systems Analysis, Internet Concepts, Computer Operations, Networks and Communications, and E-Commerce. The electives for this degree consist of ad-

vanced coursework in the areas introduced by the required courses.

### **General Education Communications Requirements**

Each degree will provide students with opportunities to enhance their writing and speaking skills (beyond the required English 20 class) by requiring that they complete at least two Communications Intensive courses, at least one of which should be in the student's major. Communication Intensive (CI) courses may be focused on writing, speaking, or combinations thereof. Two Communications Emphasized (CE) courses may be used at the equivalent of one CI course (for example, four CE courses would substitute for two CI courses, but two of the CE courses must be in the one CI in the student's major). These requirements will be formally tracked and monitored by the CAPS advising system to ensure that each graduating student, meets, the Communications component of the General Education requirement.

## **Bachelor of Science Degree School of Materials, Energy, and Earth Resources (General Requirements)**

This degree can be earned in the following areas: ceramic engineering, geological engineering, geology and geophysics, metallurgical engineering, mining engineering, nuclear engineering, and petroleum engineering.

Entering freshmen desiring to study engineering will be admitted to the Freshman Engineering Program (see page 164). They will, however, be permitted, if they wish, to state a departmental preference, which will be used as a consideration for available freshman departmental scholarships. The focus of the program is on enhanced advising and career counseling, with the goal of providing to the student the information necessary to make an informed decision regarding the choice of an engineering major.

For the Bachelor of Science degree in the School of Materials, Energy, and Earth Resources a minimum of 128 credit hours is required. These requirements are in addition to credit received for algebra, trigonometry, and basic ROTC courses. An average of at least two grade points per credit hour must be attained. At least two grade points per credit hour must also be attained in all courses taken in the student's major department.

Each Engineering curriculum contains a required number of hours in humanities and social sciences as specified by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Each student's program of study must contain a minimum of 16-18 credit hours of course work (de-

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pending upon the school and the major) from the humanities and the social sciences areas and should be chosen according to the following rules:

- 1) All students are required to take one American history course and one economics course. The history course is to be selected from History 112, 175, History 176, or Political Science 90. The economics course may be either Economics 121 or 122. Some disciplines require one humanities course to be selected from the approved lists for art, English, foreign languages, music, philosophy, speech and media studies, or theater.
- 2) Of the remaining hours, six credit hours must be taken in humanities or social sciences at the 100 level or above and must be selected from the approved lists. Each of these courses must have as a prerequisite one of the humanities or social sciences courses already taken. Foreign language courses numbered 70 to 80 can be considered to be one of these courses. (Students may receive humanities credit for foreign language courses in their native tongue only if the course is at the 300 level.) All courses taken after graduating from high school.
- 3) Some departments list specific requirements; e.g., a psychology course, a literature course, and /or a second semester of economics. Selections should be made to ensure that these requirements are met.
- 4) Skill courses are not allowed to meet humanities and social sciences requirements except in foreign languages. Students who select the foreign language option are urged to take more than one course.
- 5) Special topics, special problems courses and honors seminars are allowed only by petition to and approval by the student's department chairman and dean.

The engineering programs at UMR are characterized by their focus on the scientific basics of engineering and their innovative application; indeed, the underlying theme of these educational programs is the application of the scientific basics to engineering practice through attention to problems and needs of the public. The necessary interrelations among the various topics, the engineering disciplines, and the other professions as they naturally come together in the solution of real world problems are emphasized as research, analysis, synthesis, and design are presented and discussed through classroom and laboratory instruction.

### Accreditation

Missouri law requires that all applicants for registration as professional engineers be graduates of engineering programs accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET) or possess an education which includes at the minimum a baccalaureate degree in engineering and which, in the opinion of the registration board, equals or exceeds the education received by a graduate of a program accredited by EAC/ABET.

All UMR bachelor's level engineering programs are ABET accredited. Applicants who receive advanced degrees from UMR engineering programs, but do not have

undergraduate engineering degrees, may not be eligible for registration in Missouri. Such applicants may wish to consider studying toward a bachelor's degree in their chosen engineering field. If so they should consult with their department chairman regarding specific requirements. All eligible graduates are strongly encouraged to seek professional engineer registration.

### General Education Communications Requirements

Each department will provide students with opportunities to enhance their writing and speaking skills (beyond the required English 20 class) by required that they complete at least two Communications Intensive courses, at least one of which should be in the student's major. Communication Intensive (CI) courses may be focused on writing, speaking, or combinations thereof. Two Communications Emphasized (CE) courses may be used at the equivalent of one CI course (for example, four CE courses would substitute for two CI courses, but two of the CE courses must be in the one CI in the student's major). These requirements will be formally tracked and monitored by the CAPS advising system to ensure that each graduating student is meeting the Communications component of the General Education requirement.

## Dual Bachelor's Degree

Combination curricula leading to two baccalaureate degrees can be arranged in any two fields. The amount of additional credit required for the second baccalaureate degree will be based on the student's educational background and determined for each case by the academic department which offers the curriculum leading to the second degree. The chair of the department will submit a list of the specific course and credit hour requirements, together with the student's transcript, to the dean of the school/college for approval. This list will then be forwarded to the Registrar and constitute the official requirement for the second degree. Since the B.A. degree is unspecified as to major there will be no dual Bachelor of Arts degree offerings. A student entering UMR with a baccalaureate degree must take a minimum of 30 hours to receive another bachelor's degree.

When requirements for a degree in two departments have been completed without either degree being awarded, both degrees may be awarded at the same commencement.