

placement is the responsibility of the Director of Student Teaching, department faculty, and school district personnel.

Student Teacher Placement Options

Option 1: Local area (no additional costs/fees)

The Carroll College local placement areas are within commuting distance of the Carroll campus and include the following districts:

Helena School District #1

East Helena School District #9

Montana City School District #27

Option 2: Out-of-area (within Montana; may require additional costs/fees.)

Student teacher candidates requesting student teaching assignments outside the Option 1 placement areas must have a legitimate reason for doing so. Out-of-area placements in other communities or settings within Montana will be made when:

- (1) Helena area school districts (see Option 1) cannot provide an appropriate placement in the student's area of licensing.
- (2) An out-of-area placement provides a move valuable experience in the student's area of licensing.
- (3) A placement in the Helena area will impose extreme hardship and prevent the student from completing the student teaching experience.

For any out-of-area request to be approved, the faculty members of the Department of Education must judge that there is a very low probability that the student will require intervention of department faculty members during his/her student teaching experience.

All out-of-area student teaching placements must be approved by the faculty members of the Department of Education prior to student teaching assignments. A student seeking an out-of-area student teaching placement must submit a written request to the Education Department Chair explaining in detail the rationale for his/her request. Appropriate documentation supporting the request should also be attached.

If the requested teaching site is within the state of Montana, but outside Option 1 areas defined above, the Director of Student Teaching will determine the best possible supervision model, either with Carroll College supervisors, with contracted supervision by another college/university, or with another qualified individual. If the student's request is approved, all costs for supervision that would exceed those incurred during a Helena placement must be borne by the student teaching candidate. This may include the salary of the college supervisor and all expenses associated with travel, lodging and meals.

Option 3: Out-of-state (outside of Montana; will likely require additional costs/fees.)

Students may request to do their student teaching out-of-state in accordance with the guidelines and approval process outlined above in Option 2 – Out-of-area. All out-of-state student teaching placements must be approved by the faculty members of the Department of Education prior to student teaching assignments. A student seeking an out-of-state student teaching placement must submit a written request to the Education Department Chair explaining in detail the rationale for his/her request (based upon 3 criteria listed in Option 2 above). Appropriate and complete documentation in support of the request should also be attached. The Director of Student Teaching will determine contracted supervision by another college/university or with another qualified individual. If the student's request is approved, all costs for supervision that would exceed those incurred during a Helena

placement must be borne by the student teaching candidate. This may include the salary of the college supervisor and all expenses associated with travel, lodging and meals.

Content Knowledge Requirement

In order to be recommended for a Montana teaching license, a student seeking a K-8 license must receive a score of at least "8" on the Content Knowledge Worksheet. This worksheet is based on three indicators of knowledge: 1) student's grade point average of 11 specified content area courses, 2) content knowledge as demonstrated during student teaching, and 3) the score obtained on the PRAXIS II Elementary Content Knowledge test.

The Content Knowledge Worksheet may be obtained in 120 O'Connell Hall. Students seeking a 5-12 license or a K-12 license without a K-8 license, will be required to demonstrate content knowledge by receiving a specific score on a PRAXIS II test, if OPI (Office of Public Instruction) has named the test to be used.

Competency Requirement: All Education Options

In the event that supervisory personnel of the Department of Education: Health, Physical, and Teacher decide to withdraw a student from student teaching or the internship program due to lack of growth toward competency in teaching, every effort will be made to provide alternative routes to graduation.

Education Advisory Board

In striving to provide quality education for Carroll College's elementary and secondary preservice and in-service teachers, the Department of Education: Health, Physical, and Teacher solicits input from people involved in the educational community. The Education Advisory Board is a group of recognized educational professionals and students who gather as needed to discuss and document ideas. The Board consists of 36 members who represent diverse geographic areas and interest groups.

Transportation

Transportation is not provided to or from classes, including those held off campus.

ENGINEERING (3-2)

GARRY FISCHER, M.S.

MARY E. KEEFFE, PH.D.

TERENCE J. MULLEN, P.E.

JOHN L. SCHARE, PH.D.

ANTHONY M. SZPILKA, PH.D.

WILLIS WEIGHT, PH.D.

See also Civil Engineering.

Mission and Goals

Consonant with the mission of the College, this department is "dedicated to providing for its students the means for their full realization of a dual goal of vocation and enlightenment." Society requires competent professionals who can solve contemporary problems by using connections among disciplines, especially the humanities, engineering and technology, and the sciences. The Programs within this Department are designed to blend the unique characteristics of Catholic liberal arts education with preparation for productive and rewarding professional careers. The four professional educational objectives of this department are to produce graduates who have:

- 1) The specialized knowledge and skills necessary for initiation into their chosen profession,
- 2) A broad range of skills necessary for effective communication,

- 3) An appreciation for the interrelationships among the branches of knowledge,
- 4) The ethical, social, and aesthetic perspectives necessary for values-based judgment and decision-making.

3-2 Engineering: Major in Engineering Mathematics

A student who completes the requirements for the 3-2 Engineering Major in Engineering Mathematics earns two degrees:

1. A Bachelor of Arts degree with a major in Engineering Mathematics from Carroll College, and
2. A Bachelor of Science degree with a major in a selected field of engineering (e.g., mechanical engineering) from one of the following affiliated engineering schools:

Columbia University, New York, NY
 The University of Notre Dame, South Bend, IN
 The University of Southern California, Los Angeles, CA
 The University of Minnesota, Minneapolis, MN
 Gonzaga University, Spokane, WA
 Montana Tech of the University of Montana, Butte, MT
 Montana State University, Bozeman, MT

Engineering fields, which 3-2 students may select, include the following:

Aerospace Engineering
 Engineering Mechanics
 Chemical Engineering
 Engineering Science
 Civil Engineering
 Geological Engineering
 Computer Engineering
 Geophysical Engineering
 Electrical Engineering
 Industrial Engineering
 Environmental Engineering
 Material Science Engineering
 Mechanical Engineering
 Metallurgical Engineering
 Applied Biology
 Mineral or Mining Engineering
 Applied Chemistry
 Nuclear Science and Engineering
 Applied Geophysics
 Operations Research
 Biological Engineering
 Petroleum Engineering

The purposes of the 3-2 program are to provide the student with a traditional engineering education augmented with a strong liberal arts background and to provide a broader and deeper exposure to mathematics and its applications than would ordinarily be possible in a four year engineering program.

Under the 3-2 program, a student attends Carroll College for three years and then selects and transfers to one of seven affiliated engineering schools for two years of study. Upon successful completion of the five-year program, the student receives a Bachelor of Arts degree with a major in engineering mathematics from Carroll College and a Bachelor of Science degree with a selected engineering major from the engineering school.

Carroll College continually reviews its curriculum with the seven affiliated schools to ensure that 3-2 students can complete any of the engineering majors in the five-year program.

A program to prepare students for graduate studies in engineering is offered via the mathematics major with a cognate concentration in engineering.

A student in the 3-2 engineering program will be accepted at any one of the seven engineering schools on the written recommendation of the engineering program faculty. Before a student will be considered for a recommendation, at least a 2.60 cumulative grade average and a 2.60 average in the "Major Program Requirements" and in the "Other Program Requirements" must be achieved by the end of the fifth semester at Carroll College.

I. Major Program Requirements

ENGR 104 Engineering Graphics and CAD Applications
 ENGR 201 Engineering Design Process
 ENGR 302 Engineering Mechanics I: Statics
 ENGR 308 Thermodynamics

Technical Electives: Four courses of three or four credits each, selected on the basis of the engineering field of interest and with approval of the engineering advisor. Technical electives must be selected as follows: one from Category I, two from Category II, and one from Category III. Technical electives include the following courses:

CH 301-302 Organic Chemistry I and II (Category I and III)
 CS 110 Programming (Category I)
 CS 330 Computer Networking I (Category III)
 ENGR 303 Engineering Mechanics II: Solids (Category II)
 ENGR 304 Engineering Mechanics III: Dynamics (Category III)
 ENGR 305-306 Electronics and Circuit Analysis I and II (Category I and III)
 ENGR 307 Fluid Mechanics (Category II)
 ENGR 309 Geotechnical Engineering (Category II)
 ENGR 310 Structures I (Category III)
 ENGR 313 Hydrology (Category III)

II. Other Program Requirements

CH 101-102 General Chemistry I and II
 EC 201 or 202 Principles of Economics (EC 202 preferred)
 EC 203 Project Management Economics
 ENWR 305 Technical Writing
 MA 131 Calculus of Single Variable Functions
 or MA 121-122 Differential and Integral Calculus
 MA 232 Differential Equations and Linear Algebra I
 MA 233 Multivariable Calculus
 MA 334 Differential Equations and Linear Algebra II
 MA 336 Probability and Statistics I
 MA 341 Probability and Statistics II
 or MA 342 Numerical Computing and Visualization
 PHYS 205-206 Engineering Physics I and II

III. Carroll College Core Curriculum

To earn a Bachelor of Arts degree from Carroll College a student must complete the Carroll College Core Curriculum as listed in this catalog. However, since these requirements must be completed within 3 years, a total of only nine credits of philosophy and theology instead of twelve, six credits of one and three credits of the other. In addition, a student must earn a grade of "C" or better in all of the courses listed under "Major Program Requirements" and "Other Program Requirements." A lesser grade in any of these courses must be replaced before the Bachelor of Arts degree will be granted. In addition, lesser grades in any of these courses preclude taking subsequent courses for which the deficient courses are prerequisite.

IV. Additional Requirements

1. The requirements for the Bachelor of Arts degree with a major in engineering mathematics under the 3-2 program differ from those for the four-year mathematics majors. Students in the 3-2 engineering major are not required to fulfill the requirements for the four-year mathematics major.
2. The requirements listed in sections I, II, and III above must be completed before transferring to an affiliated engineering school and cannot be satisfied by credits earned at the engineering school after the student has transferred.
3. Students transferring to Carroll College and entering the 3-2 program must complete at least two full-time semesters at Carroll College before they will be considered for a recommendation to transfer to an affiliated school. In addition, these students must complete a minimum of eighteen credits in the Department of Mathematics, Engineering and Computer Science at Carroll College. Credits transferred to Carroll do not satisfy this requirement.
4. A Student who transfers to a non-affiliated engineering school and completes an engineering degree in an ABET accredited program is eligible to receive the Bachelor of Arts degree with a major in engineering mathematics from Carroll College. The Carroll degree is awarded provided that the student has completed all requirements for the degree listed in sections I, II, III, and IV.
5. Some engineering schools and/or departments require a grade point average higher than 2.60 for admission to junior and senior level courses. Some departments may also require the completion of a summer field or laboratory course for graduation in that department. In rare cases, additional course work may be required to satisfy a specialized engineering curriculum. These are requirements that apply to all students entering these programs and must also be satisfied by 3-2 students. Students in 3-2 engineering must consult with the director of engineering programs at Carroll College to select a school and field of study for which they qualify.

ENGINEERING MECHANICS

GARY FISCHER, M.S.
MARY E. KEEFFE, PH.D.
TERENCE J. MULLEN, P.E.
JOHN L. SCHARF, PH.D.
ANTHONY M. SZPILKA, PH.D.
WILLIS WEIGHT, PH.D.

Department Mission and Goals

Consonant with the mission of the College, this department is “dedicated to providing for its students the means for their full realization of a dual goal of vocation and enlightenment.” Society requires competent professionals who can solve contemporary problems by using connections among disciplines, especially the humanities, engineering and technology, and the sciences. The Programs within this Department are designed to blend the unique characteristics of Catholic liberal arts education with preparation for productive and rewarding professional careers. The four professional educational objectives of this department are to produce graduates who have:

- 1) The specialized knowledge and skills necessary for initiation into their chosen profession,
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- 4) The ethical, social, and aesthetic perspectives necessary for values-based judgment and decision-making.

The major in Engineering Mechanics is a broad-based, general engineering major designed to prepare graduates who can go directly into graduate programs in engineering mechanics, structural engineering, mechanical engineering, aerospace engineering, environmental engineering, applied mathematics, or applied physics. In addition, this major is designed to meet accreditation criteria specified by the Accreditation Board for Engineering and Technology (ABET). As a result, Carroll graduates with a major in Engineering Mechanics will be eligible to take the two Professional Engineering licensure exams and thereby earn a Professional Engineer license. The civil engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board of Engineering & Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012. Telephone: 410-347-7700.

The Engineering Mechanics Program has adopted the philosophy and goals of the department. The four major areas of study with the Program are: structures, environmental, water resources, and transportation.

I. Major Program Requirements

ENGR 105 & ENGR 106 GIS/Surveying/CAD I and II *
ENGR 202 Water Distribution Systems
ENGR 302 Engineering Mechanics I: Statics
ENGR 303 Engineering Mechanics II: Solids
ENGR 304 Dynamics
ENGR 305 Electrical Circuits and Electronics I
ENGR 306 Electrical Circuits and Electronics II
ENGR 307 Fluid Mechanics
ENGR 308 Thermodynamics
ENGR 310 Structures I
ENGR 313 Hydrology
ENGR 401 Hydraulics
ENGR 411-412 Senior Design Project
ENGR/MA 4XX Numerical Computing II*

II. Other Program Requirements

CS 110 Java Programming
CS/MA 106 Programming in Excel*
EC 201 or 202 Principles of Economics (EC 202 preferred)
EC 203 Project Management Economics
ENWR 305 Technical Writing
MA 131 Calculus of Single Variable Functions
or MA 121-122 Differential and Integral Calculus
MA 232 Differential Equations and Linear Algebra I
MA 233 Multivariable Calculus
MA 334 Differential Equations and Linear Algebra II
MA 336 Probability and Statistics I
MA 341 Probability and Statistics II
MA 342 Numerical Computing
MA 341 Numerical Computing
MA 421 Optimization
PHIL 207 Business Ethics
PHYS 205-206 Engineering Physics

Students must take the Fundamental of Engineering (FE) exam within nine months prior to receiving the degree.

To earn a Bachelor of Arts degree with a major in engineering mechanics, a student must earn a grade of “C” or better in all of the courses listed under “Major Program Requirements” and under “Other Program Requirements.” A lesser grade in any of these courses must be replaced before the Bachelor of Arts degree with a major in engineering mechanics will be granted. In addition, lesser