

## Faculty

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Study in the physical sciences constitutes observation of our surroundings and an attempt to describe these observations, frequently with the language of mathematics. From these attempts, our understanding of the universe, from the smallest subatomic particles to the farthest galaxies, has developed and is developing. The scientist or engineer is often involved in both the development of the understanding and its application for the betterment of humankind. The fields of physics, chemistry, engineering, astronomy, geology and mathematics are housed in the Physical Science Division. Individuals wanting to prepare for transfer with an emphasis in any of these fields should pursue an associate of science degree. Courses used to satisfy prerequisites for courses in the Physical Science Division require a grade of "C-" or better. The individual program of study will be developed in consultation with an academic advisor.

### Associate of Science Degree with specialization in

- Chemistry
- Drafting
- Engineering
- Mathematics
- Physics

### Associate of Applied Science Degree

- Drafting

## Chemistry

Chemistry courses are offered primarily to those students who want chemistry to fill their science course requirements. Individuals who want to specialize in chemistry should work closely with their advisor to devise a suitable associate of science degree program.

The associate of science specialization in chemistry emphasizes the tradi-

tional areas of chemistry at the freshman and sophomore level. The specialization provides basic education in chemistry with sufficient flexibility to allow students to transfer to a variety of four-year schools offering bachelor's degrees in chemistry. Students must successfully complete core courses with a "C-" or better to meet specialization requirements. Students who are planning to transfer to a four-year program may need to have additional hours beyond the specialization requirements at Northwest College in order to transfer in as a junior. These students should consult with their advisor and the appropriate four-year college catalog.

## Chemistry Education

For secondary education majors: to facilitate transfer to a four-year college as a junior, students planning to become middle school or high school teachers in chemistry are encouraged to complete both the Secondary Education specialization and at least a specialization in the subjects they plan to teach. Consult your advisor every semester when selecting courses.

### ASSOCIATE OF SCIENCE with specialization in CHEMISTRY

#### General Education Requirements

Number and Title	Credits
Students should refer to the Graduation Requirements on pages 23-26 .....	24-27

*Four hours of Science and three hours of Mathematics will be fulfilled by taking Core Courses.*

#### Core Courses

Number and Title	Credits
CHEM 1020—General Chemistry I .....	4
CHEM 1030—General Chemistry II .....	4
CHEM 2320—Organic Chemistry I .....	4
CHEM 2340—Organic Chemistry II .....	4
MATH 2200—Calculus I .....	5
MATH 2205—Calculus II .....	5
CHEM 2540—Chemistry Capstone Seminar .....	1
<b>TOTAL</b>	<b>27</b>

Transfer and General Electives selected in consultation with advisor .....

### Transfer and General Electives

It is very strongly recommended that students intending to seek a four-year degree in chemistry take at least three courses (11 hour minimum) from the following. Two of the three courses should be a PHYS sequence.

Number and Title	Credits
CHEM 2230—Quantitative Analysis .....	4
MATH 2210—Calculus III .....	5
MATH 2310—Applied Differential Equations I .....	3
PHYS 1110—General Physics I .....	4
PHYS 1120—General Physics II .....	4
PHYS 1310—College Physics I .....	4
PHYS 1320—College Physics II .....	4
<b>MINIMUM CREDITS FOR DEGREE = 64</b>	

## Drafting

Drafting technology includes courses in mechanical and architectural drafting, cartography, mathematics, science, communications and a wide range of electives including engineering. Students are expected to have keyboarding skills. Graduates of the program can elect to seek employment in industry or transfer to a bachelor's degree program. The program provides an excellent background for further study in related fields including engineering, architecture, construction, technical education and graphics. A technical program is also available for those who desire to enter the field after two years of study.

This specialization is designed to allow students to receive an associate of science degree with a specialization in drafting. Students who successfully complete the specialization will have a foundation to seek employment or transfer to a four-year school in drafting. Students must complete the core courses with a "C-" or better in each class. Students who are planning to transfer to a four-year program may need to have additional hours beyond the specialization requirements at Northwest College in order to transfer in as a junior. These students should consult with their advisor and the appropriate four-year college catalog.

### ASSOCIATE OF SCIENCE with specialization in DRAFTING

#### General Education Requirements

Number and Title	Credits
Students should refer to the Graduation Requirements on pages 23-26 .....	24-27

**Core Courses**

Number and Title	Credits
ENTK 1510—Drafting I.....	3
ENTK 1520—Drafting II.....	3
ENTK 1710—Architectural Drafting I.....	3
ENTK 1720—Architectural Drafting II.....	3
ENTK 1800—Cartography.....	3
ENTK 2500—Computer Aided Drafting I....	3
ENTK 2505—Computer Aided Drafting II... 3	
ENTK 2510—Computer Aided Drafting III... 3	
ENTK 2530—Computer Aided Drafting 3-D. 3	
<b>TOTAL 27</b>	

Transfer and General Electives selected in .....  
consultation with advisor ..... 13-16

**Transfer and General Electives**

Students who are planning to transfer to a four-year program in drafting or who plan to enter the workforce in drafting related fields will need to have additional hours beyond the specialization requirements at Northwest. These students should take courses from the following list of suggested electives in consultation with their advisors.

Number and Title	Credits
ACCT 2010—Principles of Accounting I.....	4
ART 1110—Design: 2-D.....	3
ART 1120—Design: 3-D.....	3
BMIS 2000—Computer Information Systems.....	3
BOTK 2950—Employment Orientation.....	1
CMA 1610—Windows I.....	1
CMA 1650—Local Area Networks I.....	3
CMA 2900—Advanced Integrated Computer Applications.....	3
ENGL 2010—Technical Writing.....	3
ENTK 1750—Commercial Architectural Drawing.....	3
ENTK 2070—Engineering Surveying.....	3
GRAR 1510—Introduction to Graphic Arts ... 3	

**ASSOCIATE OF APPLIED SCIENCE DRAFTING**

**General Education Requirements**

Number and Title	Credits
ENGL 1010—English I: Introduction to Composition.....	3
or	
ENGL 1110—Advanced English Composition.....	3
BADM 1020—Business Communication.....	3
MATH 1405—Precalculus Trigonometry.....	3
or	
MATH 1450—Precalculus Algebra and Trigonometry.....	5
POLS 1000—American and Wyoming Government.....	3
or	
HIST 1210—United States History I.....	3
and	
HIST 1250—History of Wyoming.....	3
Humanities/Soc Sci/V & P Arts.....	6
Wellness Education.....	2
<b>TOTAL 20-23</b>	

**Core Courses**

Number and Title	Credits
BOTK 2950—Employment Orientation.....	1
CMA 1500—Computer Keyboarding.....	1
ENTK 1510—Drafting I.....	3
ENTK 1520—Drafting II.....	3
ENTK 1710—Architectural Drafting I.....	3
ENTK 1720—Architectural Drafting II.....	3
ENTK 1750—Commercial Architectural Drafting.....	3
ENTK 1800—Cartography I.....	3
ENTK 2070—Engineering Surveying.....	3
ENTK 2500—Computer Aided Drafting I.... 3	
ENTK 2505—Computer Aided Drafting II ... 3	
ENTK 2510—Computer Aided Drafting III..... 3	
<b>TOTAL 32</b>	

**Electives \***

Number and Title	Credits
ACCT 1050—Practical Accounting.....	3
AGTK 1530—Principles of Technology I.... 3	
AGTK 1540—Principles of Technology II.... 3	
ART 1110—Design: 2-D.....	3
ART 1120—Design: 3-D.....	3
ART 2120—Graphic Design I.....	3
GRAR 1810—Electronic Publishing I.....	3
PHTO 1610—Introduction to Photography..... 3	
PHYS 1050—Concepts of Physics.....	4

TOTAL CREDITS FOR DEGREE = 67-70

\* Consult with advisor. Choose a minimum of 13 elective credits.

**Engineering**

The various fields in engineering are related in that they all require a thorough understanding of basic scientific laws. Engineers apply scientific knowledge and principles to the design and operation of machines, to the selection of materials, to the environmental betterment of humankind, and to the economical use of personnel, money, and energy.

The associate of science specialization in engineering emphasizes the traditional core of engineering at the freshman and sophomore level. The specialization provides basic education in engineering with sufficient flexibility to allow students to transfer to a variety of four-year schools offering bachelor of science degrees in engineering. Students must successfully complete core courses with a "C-" or better to meet specialization requirements. Students who are planning to transfer to a four-year program may need to have additional hours beyond the specialization requirements at Northwest College in order to transfer in as a junior. These students should consult with their

advisor and the appropriate four-year college catalog.

**ASSOCIATE OF SCIENCE with specialization in ENGINEERING**

**General Education Requirements**

Number and Title	Credits
Students should refer to the Graduation Requirements on pages 23-26.....	24-27

Three hours of Mathematics may be fulfilled by taking Core Courses.

**Core Courses**

The following courses are traditionally considered to be the core of the first two years of an engineering curricula, as dictated by the American Board of Engineering and Technology Education (ABET) and by the content of the Fundamentals of Engineering Exam (FE).

Number and Title	Credits
ES 1000—Orientation to Engineering.....	1
ES 2110—Statics.....	3
ES 2120—Dynamics.....	3
MATH 2200—Calculus I.....	5
MATH 2205—Calculus II.....	5
MATH 2210—Calculus III.....	5
MATH 2310—Applied Differential Equations I (capstone).....	3
<b>TOTAL 25</b>	

Transfer and General Electives selected in consultation with advisor ..... 15-18

**Transfer and General Electives**

The student who plans to transfer to a four-year program in engineering will need to have additional hours beyond the specialization requirements at Northwest. These students should take courses from the following list of suggested electives in consultation with their advisors.

Number and Title	Credits
CHEM 1020—General Chemistry I.....	4
CHEM 1030—General Chemistry II.....	4
ENGL 2010—Technical Writing.....	3
ENTK 1510—Drafting I.....	3
ENTK 2070—Engineering Surveying.....	3
ENTK 2500—Computer Aided Drafting I.... 3	
ENTK 2505—Computer Aided Drafting II ... 3	
ENTK 2510—Computer Aided Drafting III... 3	
ES 1060—Introduction to Engineering Computing.....	3
ES 2210—Electric Circuit Theory.....	4
ES 2310—Thermodynamics.....	4
ES 2330—Fluid Dynamics/Mechanics.....	3
ES 2410—Mechanics of Materials.....	3
PHYS 1310—College Physics I.....	4
PHYS 1320—College Physics II.....	4

## Geology

Northwest offers several courses on Geology. The science of geology is concerned with the materials, processes, and history of the earth. It attempts to explain how the earth changes. As such, it contributes to our understanding of our environment, its resources, hazards, and limits.

Employment opportunities exist with government agencies and with consulting firms. The work ranges from resource development and solution of environmental problems to pure research into the origins and history of the earth. Education for employment requires a broad background in the physical and mathematical sciences. Most professional geologists have master's degrees.

## Mathematics

Mathematics courses are designed to meet the needs of students in all departments of the college: students who plan to teach mathematics, and those specializing in such fields as chemistry, physics, and engineering who need a foundation in mathematics, and students who pursue other academic careers and want practice in the art of logical, clear, and accurate thinking.

Individuals who want to concentrate in mathematics in a program designed for transfer to a senior institution may pursue an associate of science degree in mathematics.

The associate of science specialization in mathematics emphasizes the traditional core of mathematics at the freshman and sophomore level. The specialization provides basic education in mathematics with sufficient flexibility to allow students to transfer to a variety of four-year schools offering bachelor of science degrees in mathematics. Students must successfully complete core courses with a "C-" or better to meet specialization requirements. Students who are planning to transfer to a four-year program may need to have additional hours beyond the specialization requirements at Northwest College in order to transfer in as a junior. These students should consult with their advisor and the appropriate four-year college catalog.

## Mathematics Education

For secondary education: to facilitate transfer to a four-year college as a junior, students planning to become middle school or high school teachers are encouraged to complete both the Secondary Education specialization and at least a specialization in the subjects they plan to teach. Consult your advisor every semester when selecting courses.

### ASSOCIATE OF SCIENCE with specialization in MATHEMATICS

#### General Education Requirements

Number and Title	Credits
Students should refer to the Graduation Requirements on pages 23-26 .....	
	24-27

*Three hours of Mathematics may be fulfilled by taking Core Courses.*

#### Core Courses

Students must complete four of the five courses.

Number and Title	Credits
MATH 1405—Precalculus Trigonometry .....	3
or	
MATH 1450—Precalculus Algebra/ Trigonometry .....	5
MATH 2200—Calculus I .....	5
MATH 2205—Calculus II .....	5
MATH 2210—Calculus III .....	5
MATH 2310—Applied Differential Equations I .....	3
<b>TOTAL</b>	<b>15-18</b>

Transfer and General Electives selected in consultation with advisor ..... 21-28 (Students taking MATH 2310 may use it for their capstone course. Students not taking MATH 2310 will need to take a different capstone course selected in consultation with their advisors.)

## Physics

Physics concerns itself with the construction of theories describing the entire universe in terms of fundamental laws and fundamental particles. Individuals who want to prepare for transfer to a senior institution should work closely with their advisors to devise suitable associate of science programs.

The associate of science specialization in physics emphasizes the traditional four-

year physics at the freshman and sophomore level. It provides basic education in physics and related support areas such as chemistry and mathematics, as well as sufficient flexibility to allow students to transfer to a variety of four-year bachelor's degree programs in physics. Students must successfully complete core courses with a "C-" or better to meet specialization requirements. Students who are planning to transfer to a four-year program may need to have additional hours beyond the specialization requirements at Northwest College in order to transfer in as a junior. These students should consult with their advisor and the appropriate four-year college catalog.

### ASSOCIATE OF SCIENCE with specialization in PHYSICS

#### General Education Requirements

Number and Title	Credits
Students should refer to the Graduation Requirements on pages 23-26 .....	
	24-27

*Four hours of Science and three hours of Mathematics will be fulfilled by taking Core Courses.*

#### Core Courses

Number and Title	Credits
MATH 2200—Calculus I .....	5
MATH 2205—Calculus II .....	5
MATH 2210—Calculus III .....	5
MATH 2310—Applied Differential Equations I .....	3
PHYS 1310—College Physics I .....	4
PHYS 1320—College Physics II .....	4
<b>TOTAL</b>	<b>25</b>

Transfer and General Electives selected in consultation with advisor..... 19-22

#### Transfer and General Electives

Students who are planning to transfer to a four-year program in physics or physics education will need to have additional hours beyond the specialization requirements at Northwest. These students should take courses from the following list of suggested electives in consultation with their advisors.

Number and Title	Credits
ASTR 1050—Survey of Astronomy .....	4
CHEM 1020—General Chemistry I .....	4
CHEM 1030—General Chemistry II .....	4
ES 1060—Introduction to Engineering Computing .....	3
ES 2110—Statics .....	3
ES 2120—Dynamics .....	3
ES 2210—Electric Circuit Theory .....	4
ES 2310—Thermodynamics .....	4