

# ASSOCIATE OF SCIENCE DEGREES AND CERTIFICATES

*For students who intend to continue their education  
at a four-year degree granting institution*

To receive the A.S. degree, students must satisfactorily complete a minimum of 64 credits. This includes 35 credits to meet the general education core requirements, 3 credits in computer science, and at least 28 credits in an area of concentration.

## Transferable General Education Common Core

The general education common core was developed through collaboration of New Mexico's public postsecondary institutions to facilitate transfer of students between New Mexico's institutions of higher education. For students enrolled at any public institution in New Mexico, the general education common core courses will transfer to any other New Mexico public college or university and apply toward associate and baccalaureate degree program requirements. (Students preparing for careers in engineering, health sciences, or other profession-related fields are advised that some of this coursework may not transfer toward general education requirements but in most cases will apply toward elective requirements.)

## Transferable Associate of Science

The Associate of Science degree is intended for transfer to a four-year baccalaureate granting institution. Those wishing to transfer to a baccalaureate granting institution and pursue a degree program are strongly encouraged to check with their advisor and carefully coordinate their coursework at San Juan College with the requirements of the transfer institution. Prerequisite courses must be completed prior to the courses listed below (e.g., MATH 160 and 180 prior to MATH 188). In general, however, it is suggested that students complete the New Mexico Transfer Module as outlined.

## Transfer Guides and Catalogs

Several transfer guides have been developed through collaboration of New Mexico's postsecondary institutions. Students who have selected a field of study and/or the college or university where they wish to graduate are advised to consult the transfer guide or catalog for that institution for advice to guide their course selection. Planning for effective transfer is ultimately the student's responsibility. Responsible transfer planning includes early and regular consultation with the intended transfer institution to assure that all pre-transfer coursework will meet the requirements of the desired degree. The Core Advisor in Science is another useful resource.

## Program Concentration Choice

The general education list of 35 credit hours is the safest choice for students who have not yet selected either a major field of study or the college or university they plan to attend after San Juan College. Students wishing to prepare for possible transfer into a degree program at another institution are advised to take these general education courses during their freshman and sophomore years.

## General Education Requirements for Associate of Science Degrees

General Education Requirements*	Credits
<b>Area I: Communications</b>	<b>9</b>
ENGL 111 Freshman Composition	3
ENGL 211 Advanced Composition <b>OR</b>	
ENGL 218 Advanced Technical Composition	3
COMM 110 Public Speaking <b>OR</b>	
COMM 111 Interpersonal Communication	3
<b>Area II: Mathematics</b>	<b>3</b>
College Algebra (MATH 160)	3
Calculus I (MATH 188)	4
Other college level mathematics	3

Continued on next page

<b>Area III: Laboratory Science</b>	<b>8</b>
Eight credits of science requirements for Associate of Science degrees are included in the program requirements.	

<b>Area IV: Social and Behavioral Science</b>	<b>6-9</b>
(minimum of 6 credits, must have 15 credits total between Social/Behavioral Science area and Humanities/Fine Arts area)	
Economics (ECON 251, 252)	3
Human Geography (GEOG 145)	3
Political Science (POLS 110, 250)	3
Introduction to Psychology (PSYC 120)	3
Sociology (SOC 110, 210, 215)	3
Anthropology (ANTH 110, 210, 211, 255)	3-4

<b>Area V: Humanities and Fine Arts</b>	<b>6-9</b>
(minimum of 6 credits, must have 15 credits total between Social/Behavioral Science area and Humanities/Fine Arts area)	
History (HIST 121, 122, 211, 212)	3
Philosophy (PHIL 110, 115)	3
Literature (ENGL 251, 252, 261, 262, 245, 230, 235)	3
Orientation in Art (ARTS 110)	3
Music (MUSI 110, 111, 112, 114, 115, 130, 131)	3
Theatre (THEA 110, 120)	3
Navajo (NAVA 111, 112)	4
Spanish (SPAN 111, 112)	4

<b>General Education Credit Requirements</b>	<b>35-36</b>
--	--------------

\*Certain profession-related programs, such as engineering and nursing, may be exempt from the requirement that they apply all 35 credit hours toward general education or major requirements, but the remaining work may be accepted as elective credits. There are also special requirements for education majors.

Computer Science Requirement for Associate of Science Degree: any 3 credit Computer Science course (COSC 111 or above). Transfer colleges vary in whether they accept computer science courses as electives.

Associate of Science requirements include completion at least 27 common core credits with a 2.0 GPA or higher. Program requirements serve as a guide for selecting courses and the sequence for taking these courses. It is recognized that students often need developmental or preliminary preparation courses and more semesters to complete the A.S. degree.

Courses not included in the general core curriculum above may not necessarily be accepted by the transfer institution. Students are advised that grades below C may not transfer. Students intending to transfer to a bachelor degree granting college or university are strongly encouraged to check with their advisor and carefully coordinate their coursework at San Juan College with the requirements of the transfer institution.

## BIOLOGY

### Associate of Science

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>28</b>
NOTE: Math requirement must be MATH 188	
ENGL 211 or ENGL 218 requirement - Must take ENGL 211	
Lab Science Requirement included in Biology-core classes	

<b>Biology-core classes</b>		<b>Credits</b>
BIOL 121	Introductory Biology I	4
BIOL 122	Introductory Biology II	4
BIOL 240	Ecology	4
BIOL 255	Introduction to Genetics	4
COSC 111	Computer Literacy <b>OR</b>	
	Higher Computer Science	3
	Approved Science Selection*	20
<b>Total credit hours required for this degree</b>		<b>67</b>

\*Approved Science Selections:

BIOL 220	General Botany
BIOL 222	Invertebrate Zoology
BIOL 223	Vertebrate Zoology
BIOL 224	Microbiology
BIOL 230	Environmental Conservation
BIOL 250	Systematic Botany
BIOL 260	Introduction to Cell Biology
CHEM 111	General Chemistry I
CHEM 112	General Chemistry II
CHEM 210	Organic Chemistry Survey
CHEM 251	Organic Chemistry I
CHEM 252	Organic Chemistry II
GEOL 110	Introduction to Geology
GEOL 111	Historical Geology
PHYS 211	General Physics I
PHYS 211L	General Physics I Lab
PHYS 212	General Physics II
PHYS 212L	General Physics II Lab

## CHEMISTRY

### Associate of Science

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>27</b>
NOTE: Math requirement must be MATH 188	
Lab Science Requirement included in Chemistry-core classes	
<b>Additional Mathematics: MATH 189 Calculus II</b>	<b>4</b>

<b>Chemistry – Core classes</b>		<b>32</b>
CHEM 111	General Chemistry I	4
CHEM 112	General Chemistry II	4
CHEM 251	Organic Chemistry I	4
CHEM 252	Organic Chemistry II	4
CHEM 281	Analytical Chemistry	5
PHYS 215	Engineering Physics I	4
PHYS 216	Engineering Physics II	4
COSC 116	Spreadsheets <b>OR</b>	
COSC 118	Computer Programming Fundamentals I with C++	3

<b>Choose one Math or Science Elective:</b>	<b>4</b>
Mathematics (MATH 268 Calculus III <b>OR</b> MATH 251 Statistics)	
Biology (BIOL 121 Introductory Biology I <b>OR</b> BIOL 224 Microbiology)	
Geology (GEOL 110 Introduction to Geology <b>OR</b> GEOL 270 Mineralogy)	
Physics (PHYS 217 Engineering Physics III)	
Chemistry (CHEM 299 Chemistry Special Topics)	
<b>Total credit hours required for this degree</b>	<b>67</b>

## COMPUTER SCIENCE

### Associate of Science

The Computer Science Associate of Science degree is designed for students interested in software design and programming. Those wishing to transfer to a baccalaureate granting institution and pursue a degree program are strongly encouraged to check with their advisor and carefully coordinate their coursework at San Juan College with the requirements of the transfer institution. The rigorous nature of this degree fulfills the expectations at the baccalaureate level. This degree also begins prospective computing professors and/or research students on their path leading to graduate degrees. Consider taking a foreign language at San Juan College if your intended transfer institution has such a requirement. These courses will be in addition to the requirements listed below.

Prerequisite courses must be completed prior to the courses listed below (e.g., MATH 160 and 180 prior to MATH 188). In general, however, it is suggested that students complete the New Mexico Transfer Module as outlined below. Student must earn a grade of C or higher in all COSC courses for the course to count toward a degree.

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>27</b>
NOTE: Math requirement must be MATH 188	
ENGL 211 or ENGL 218 requirement - Must take ENGL 211	
Lab Science Requirement included in Chemistry core classes	
<b>Additional Mathematics</b>	<b>7</b>
MATH 189 Calculus II	4
MATH 231 Discrete Mathematics	3

<b>Computer Science – Core classes</b>		<b>32</b>
COSC 118	Computer Programming Fundamentals I with C++ **	3
COSC 190	Database Concepts and Principles	3
COSC 218	Computer Programming Fundamentals II with C++	3
COSC 236	UNIX	3
COSC 240	Java Programming	3
COSC 243	Web Programming on UNIX Systems	3
COSC 262	Data Structures with C++	3
COSC 270	Windows GUI Programming	3
PHYS 211	General Physics I ***	4
PHYS 212	General Physics II ***	4
<b>Total credit hours required for this degree</b>		<b>66</b>

\*\* You need to be able to use a computer, type, create documents, save files, etc. before taking COSC 118. If your computing skills are low you should take COSC 097 concurrently.

\*\*\* Read the current catalog of your intended transfer degree institution to take the most appropriate laboratory science courses. Any San Juan College approved laboratory science course may be substituted as deemed appropriate by your computer science advisor. This course also satisfies General Education laboratory science requirement. For information about NM Tech go to [www.nmt.edu](http://www.nmt.edu), NMSU [www.nmsu.edu](http://www.nmsu.edu) and Fort Lewis [www.fortlewis.edu](http://www.fortlewis.edu).

## Object-oriented Computer Programming Certificate

The Object-Oriented Computer Programming certificate is designed for students interested in computer programming. The object-oriented language C++ is covered in great depth for console and Windows GUI Programming as well as treating the standard Template Library (STL) and Microsoft Foundation Classes (MFC).

		<b>Credits</b>
COSC 118	Computer Programming Fundamentals I with C++	3
COSC 218	Computer Programming Fundamentals II with C++	3
COSC 262	Data Structures with C++	3
COSC 270	Windows GUI Programming	3
<b>Total credit hours</b>		<b>12</b>

Continued on next page

## Web Programming Certificate

The Web Programming Certificate provides a strong background with plenty of hands-on experience in structured, procedural, and object-oriented programming languages. The latest versions of C++, Java, and Perl are covered.

		Credits
COSC 118	Computer Programming Fundamentals I with C++	3
COSC 190	Database Concepts and Principles	3
COSC 202	Web Development I	3
COSC 203	Web Development II	3
COSC 218	Computer Programming Fundamentals II with C++	3
COSC 236	UNIX	3
COSC 240	Java Programming	3
COSC 243	Web Programming on UNIX Systems	3
<b>Total Credit Hours</b>		<b>24</b>

## ENGINEERING Associate of Science

It is suggested that students complete the degree as outlined and consider the additional courses accepted through the New Mexico Engineering Transfer Module (see details below degree requirements).

Students must have a minimum 2.0 grade point average and a grade of C or better in any of the courses required for transfer.

<b>Communications</b>		<b>Credits</b>
ENGL 111	Freshman Composition	3
ENGL 211	Advanced Composition	3
<b>Total Communications</b>		<b>6</b>
<b>Mathematics</b>		<b>Credits</b>
MATH 188	Calculus I	4
MATH 189	Calculus II	4
MATH 268	Calculus III	4
MATH 282	Differential Equations	4
<b>Total Mathematics</b>		<b>16</b>
<b>Social and Behavioral Science:</b>		<b>Credits</b>
	Select one course: For appropriate courses see Page 127	3
<b>Total Social/Behavioral Science</b>		<b>3</b>
<b>Humanities and Fine Arts:</b>		<b>Credits</b>
	Select one course: For appropriate courses see Page 127	3
<b>Total Humanities/Fine Arts</b>		<b>3</b>
<b>Engineering – Core classes:</b>		<b>Credits</b>
CHEM 111	General Chemistry I	4
CHEM 112	General Chemistry II	4
COSC 118	Computer Programming Fundamentals I with C++	3

ENGR 233	Mechanics-Statics	3
ECON 251	Macroeconomics <b>OR</b>	
ECON 252	Microeconomics	3
ENGR 230	Engineering Circuit Analysis	3
ENGR 112	Introduction to Engineering	3
DRFT 121	Engineering Graphics	3
ENGR 234	Mechanics-Dynamics	3
ENGR 236	Thermodynamics	3
PHYS 215/L	Engineering Physics I + Lab	4
PHYS 216/L	Engineering Physics II + Lab	4
	<b>Total Engineering Core</b>	<b>40</b>
	<b>Total credit hours required for this degree</b>	<b>68</b>

### New Mexico Engineering Transfer Module

Time permitting students are encouraged to take any or all of the following courses, as they are also included in the articulated transfer module within New Mexico.

ENGL 218	Technical Writing	3
	<b>One</b> Humanities & Fine Arts elective	3
	<b>One</b> additional Humanities & Fine Arts elective <b>OR</b> Social & Behavioral elective	3

## GENERAL SCIENCE

### Associate of Science

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>28</b>
NOTE: Math requirement must be MATH 188	
Lab Science Requirement included in Chemistry-core classes	

<b>General Science – Core classes:</b>		<b>Credits</b>
BIOL 121	Introductory Biology I	4
BIOL 122	Introductory Biology II	4
CHEM 111	General Chemistry I	4
CHEM 112	General Chemistry II	4
COSC 111	Computer Literacy <b>OR</b> Higher Computer Science	3
GEOL 110	Introduction to Geology <b>OR</b> GEOL 111 Historical Geology <b>OR</b> Science Selection*	4
PHYS 211	General Physics I	3
PHYS 211L	General Physics I Lab	1
	<b>Total General Science Core</b>	<b>27</b>

Continued on next page

Science Selection		Credits
	Science Selection* (See Science Selection below)	8
	<b>Total Science Selection</b>	<b>8</b>
Approved Elective		Credits
	Approved Elective**	3
	<b>Total Approved Electives</b>	<b>3</b>
	<b>Total credit hours required for this degree</b>	<b>66</b>

\* Science selection must include classes selected from Biology, Chemistry, Geology, and Physics.

\*\* See your advisor for approved elective.

#### Approved Science Electives:

BIOL 220	General Botany
BIOL 222	Invertebrate Zoology
BIOL 223	Vertebrate Zoology
BIOL 224	Microbiology
BIOL 230	Environmental Conservation
BIOL 250	Systematic Botany
BIOL 260	Introduction to Cell Biology
CHEM 111	General Chemistry I
CHEM 112	General Chemistry II
CHEM 210	Organic Chemistry Survey
CHEM 251	Organic Chemistry I
CHEM 252	Organic Chemistry II
GEOL 110	Introduction to Geology
GEOL 111	Historical Geology
PHYS 211	General Physics I
PHYS 211L	General Physics I Lab
PHYS 212	General Physics II
PHYS 212L	General Physics II Lab

## GEOGRAPHY

### Associate of Science

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>27</b>
NOTE: Math requirement must be MATH 160	
ENGL 211 or ENGL 218 requirement - Must take ENGL 211	
Lab Science Requirement included in Chemistry-core classes	

<b>Geography – Core classes:</b>		<b>40-42</b>
GEOG 112	World Regional Geography <b>OR</b>	
GEOG 145	Human Geography	3
GEOG 115	Map Use, Interpretation, and Design	4
GEOG 118	Introduction to Mapping Technologies	4
GEOG 111	Introduction to Physical Geography	4
GEOG 120	GPS and Surveying Methods	4
GEOG 151	Geographic Information Systems I	4
GEOG 251	Geographic Information Systems II	4
MATH 251	Statistics	4
COSC 185	Database Management Systems	3
	Approved Geography Electives**	6-8
<b>Total credit hours required for this degree</b>		<b>67-69</b>

<b>**Approved Geography Electives</b>		
GEOG 125	Weather and Climate	3
GEOG 130	Natural Hazards	3
GEOG 135	Energy and Natural Resources Geography	3
GEOG 140	Geography of the Four Corners	3
GEOG 230	Geographic Image Analysis	4
GEOL 110	Introduction to Geology	4
DRFT 150	Computer Aided Drafting (CAD)	4
COSC 214	Visual Basic I	3
COSC 118	Computer Programming Fundamentals I with C++	3
GEOG 295	GIS Topics	1-6
GEOG 299	GIS Special Problems	1-6
GEOG 285	GIS Internship	3
GEOG 280	Cooperative Education	3

## GEOGRAPHIC INFORMATION SYSTEMS Certificate

The GIS certificate is appropriate for persons interested in developing skills in geospatial technologies to use in their current profession or for those seeking immediate employment as a technician.

GEOG 118	Introduction to Mapping Technologies	4
GEOG 115	Map Use, Interpretation & Design	4
GEOG 112	World Regional Geography <b>OR</b>	
	GEOG 145 Human Geography	3
COSC 125	Business Microcomputer Applications	3
GEOG 111	Introduction to Physical Geography	4
GEOG 120	GPS and Surveying Methods	4
GEOG 151	Geographic Information Systems I	4
COSC 185	Database Management Systems	3
<b>Total Credit Hours</b>		<b>29</b>

## GEOLOGY

### Associate of Science

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>27</b>
NOTE: Math requirement must be MATH 188	
ENGL 211 or ENGL 218 requirement - Must take ENGL 211	
Lab Science Requirement included in Chemistry -core classes	

<b>Geology – Core classes:</b>		<b>39</b>
CHEM 111	General Chemistry I	4
CHEM 112	General Chemistry II	4
COSC 111	Computer Literacy <b>OR</b> higher computer course	3
GEOG 118	Introduction to Mapping Technology	4
GEOL 110	Introduction to Geology	4
GEOL 111	Historical Geology	4
GEOL 270	Mineralogy	4
GEOL 271	Petrology	4
PHYS 211/L	General Physics I w/Lab <b>OR</b>	
PHYS 215/L	Engineering Physics I w/Lab	4
PHYS 212/L	General Physics II w/Lab <b>OR</b>	
PHYS 216/L	Engineering Physics II w/Lab	4
<b>Total credit hours required for this degree</b>		<b>66</b>

## MATHEMATICS

### Associate of Science

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>27</b>
NOTE: Math requirement must be MATH 188	
ENGL 211 or ENGL 218 requirement - Must take ENGL 211	
Lab Science Requirement included in Chemistry core classes	

<b>Additional Mathematics:</b>		<b>8</b>
MATH 189	Calculus II	4
MATH 268	Calculus III	4
<b>Mathematics – Core classes:</b>		<b>28-30</b>
COSC 118	Computer Programming Fundamentals I with C++ <b>OR</b>	
COSC 214	Visual Basics I	3
MATH 231	Discrete Mathematics	3
MATH 251	Statistics	4
PHYS 215/L	Engineering Physics I w/Lab	4
PHYS 216/L	Engineering Physics II w/Lab	4

	Approved Science <b>OR</b> mathematics elective*	3-4
	Approved Science <b>OR</b> mathematics elective*	3-4
	Approved Science Elective*	4
	<b>Total credit hours required for this degree</b>	<b>64-65</b>

\* Approved science and mathematics elective courses are:

CHEM 111, 112
ENGR 230
ENGR 233
ENGR 234
ENGR 236
GEOL 110, 111
PHYS 217
MATH 275, 282

## PARAMEDIC Associate of Science

Entrance requirements and policies:

- All requirements for the Paramedic AAS/Certificate apply (see AAS section)
- Communications requirement: COMM 111
- Mathematics requirement must be MATH 160 or higher
- Core classes must be taken in same configuration as AAS/Certificate
- Students may need to consider taking additional classes appropriate to future academic pursuits and university transfer and program requirements

Note: The student must complete each course in the curriculum with a C or better to remain in and graduate from the program.

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>27</b>
---	-----------

<b>Prerequisite Classes</b>		<b>8</b>
BIOL 252	Human Anatomy and Physiology I	4
BIOL 253	Human Anatomy and Physiology II	4
<b>Paramedic – Core Classes</b>		<b>67</b>
EMSP 112	Physical Fitness for EMS	1
EMSP 112	Physical Fitness for EMS ( <i>Repeated</i> )	1
EMSP 200	Assessment and Clinical Decision Making	1
EMSP 205	Airway and Ventilatory Management	1
EMSP 211	Paramedic Professional Practice	2
EMSP 216	Emergency Pharmacology	2
EMSP 219	Medical Emergencies I	1
EMSP 225	Cardiology	3

Continued on next page

EMSP 229	Paramedic Lab I	11
EMSP 242	Trauma Management	3
EMSP 245	Advanced Cardiac Life Support	1
EMSP 246	Pediatric Advanced Life Support	1
EMSP 251	EMS Operations	2
EMSP 256	Current Issues in EMS	2
EMSP 261	Special Populations	2
EMSP 269	Medical Emergencies II	4
EMSP 271	Paramedic Clinical	4
EMSP 274	Paramedic Lab II	10
EMSP 279	Paramedic Capstone	2
EMSP 282	Paramedic Field Internship	13
<b>Total credit hours required for this degree</b>		<b>102</b>

## PHYSICS

### Associate of Science

<b>Communications</b>		<b>Credits</b>
ENGL 111	Freshman Composition	3
ENGL 211	Advanced Composition	3
COMM 110	Public Speaking <b>OR</b>	
COMM 111	Interpersonal Communication	3
<b>Total Communications</b>		<b>9</b>
<b>Mathematics</b>		<b>Credits</b>
MATH 188	Calculus I	4
MATH 189	Calculus II	4
MATH 268	Calculus III	4
<b>Total Mathematics</b>		<b>12</b>
<b>Social and Behavioral Science</b>		<b>Credits</b>
Select two courses. For appropriate courses see Page 127		
<b>Total Social/Behavioral Science</b>		<b>6</b>
<b>Humanities and Fine Arts</b>		<b>Credits</b>
Select two courses. For appropriate courses see Page 127		
<b>Total Humanities/Fine Arts</b>		<b>6</b>
<b>Physics – Core Classes</b>		<b>Credits</b>
CHEM 111	General Chemistry I	4
CHEM 112	General Chemistry II	4
COSC 118	Computer Programming Fundamentals I with C++	3
ENGR 230	Engineering Circuit Analysis	3
ECON 251	Macroeconomics <b>OR</b>	
ECON 252	Microeconomics	3
MATH 282	Differential Equations	4
ENGR 236	Thermodynamics	3

PHYS 215	Engineering Physics I	3
PHYS 215L	Engineering Physics Lab I	1
PHYS 216	Engineering Physics II	3
PHYS 216L	Engineering Physics Lab II	1
PHYS 217	Engineering Physics III	3
	<b>Total Physics Core</b>	<b>35</b>
	<b>Total credit hours required for this degree</b>	<b>68</b>

## PRE-MEDICAL SCIENCE

### Associate of Science

Note: Student must earn a C or higher in all courses.

<b>General Education Core for Associate of Science (See Page 127)</b>	<b>28</b>
NOTE: Math requirement must be MATH 188	
ENGL 211 or ENGL 218 requirement - Must take ENGL 211	
Lab Science Requirement included in core classes	

<b>Pre-medical Science Core Courses</b>		<b>Credits</b>
BIOL 121	General Biology I*	4
BIOL 122	General Biology II*	4
BIOL 255	Introduction to Genetics	4
CHEM 111	General Chemistry I*	4
CHEM 112	General Chemistry II*	4
COSC 111	Computer Literacy <b>OR</b> higher computer science	3
	Approved Science electives**	16
	<b>Total Pre-medical Science Core</b>	<b>39</b>
	<b>Total credit hours required for this degree</b>	<b>67</b>

\*\*Approved Science electives:

BIOL 224	Microbiology
BIOL 252	Anatomy and Physiology I
BIOL 253	Anatomy and Physiology II
BIOL 260	Introduction to Cell Biology
CHEM 251	Organic Chemistry I*
CHEM 252	Organic Chemistry II*
PHYS 211	General Physics I*
PHYS 211L	General Physics I Lab
PHYS 212	General Physics II*
PHYS 212L	General Physics II Lab
MATH 251	Statistics

\* Needed for MCAT