

SCHOOL OF SCIENCE & ENGINEERING

Mission Statement

The School of Science and Engineering prepares graduates with foundational concepts with the skills of the sciences to be leaders who are able to coordinate multidisciplinary teams to research, design, and implement solutions for serving effectively in their professions, while giving God-honoring leadership in the home, church, community, and world.

NOTE: WHEN A STUDENT RECEIVES A "U" GRADE FOR THE LAB PORTION OF A SCIENCE COURSE, HE/SHE RECEIVES CREDIT FOR THE COURSE, BUT THE COURSE DOES NOT COUNT FOR LABORATORY SCIENCE CREDIT IN CORE CURRICULUM.

Applied Mathematics Major

Bachelor of Science

Students in the Applied Mathematics major learn to apply fundamental knowledge of mathematics, statistics, and computing to solving quantitative problems in areas related to business, finance, data analytics, statistics, technology, and the natural sciences. The core curriculum provides students with an understanding of ideas that have shaped human thinking in mathematics and the humanities, arts, and sciences. The required courses in the major provide a broad perspective that gives students the context to comprehend God's intricate design of the universe and humanity, and how mathematics has shaped current practices in society, science, and technology. Graduates are well prepared for employment in industry, government, and education, or for further graduate studies in related applied fields. The degree is granted upon successful completion of credits specified here and on pages 51–52 (40 credits must be successfully completed in 3000- or 4000-level courses).

- **Scientific & Quantitative Literacy** mathematics course in core curriculum: MAT2121.

Required Courses 50–53 cr

BUS2011	Introduction to Business Analysis	2
BUS3835	Professional Skills Seminar	2
COS2005	Python Programming	4
MAT2055	Statistics	4
MAT2122	Calculus and Analytic Geometry II	4
MAT2221	Foundations of Mathematics I	2
MAT2222	Foundations of Mathematics II	2
MAT3211	Linear and Abstract Algebra	4
MAT3223	Calculus and Analytic Geometry III	4
MAT3225	Discrete Mathematics	2
MAT3226	Applications of Digital Logic	2
MAT3245	Geometry	4
MAT3335	Differential Equations with Applied Linear Algebra	4

MAT4845	Senior Project [OCE, WCE]	2
MAT4995	Mathematics Internship	1
Select 7 elective courses from the following:		
MAT3252	Statistics for Engineering	4
EGR3337	Signals and Systems	3
EGR4339	Numerical Analysis	3
EGR4841	Research	1–4 (REPEATABLE FOR 4 CR MAXIMUM)
DAL3255	Data Modeling	4
DAL4275	Business and Economic Forecasting	4

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SEE PAGE 49 FOR EXPLANATION AND PREREQUISITES.

Applied Mathematics Minor 18 cr

The applied mathematics minor is designed to add quantitative problem solving and rigor to other related majors, especially those in fields of business, finance, technology, and science.

Required Courses: MAT2121, 2122, 2221, 3225; six MAT-prefix credits 3000 level or above.

Biochemistry & Molecular Biology Major

Bachelor of Science

Within a Christian liberal arts education, the study of biochemistry and molecular biology reflects a commitment to understanding the molecular foundations of life as part of God's created order. The Biochemistry & Molecular Biology major explores the chemical and molecular basis of life, focusing on the structure, function, and metabolism of biomolecules and the molecular mechanisms that govern cellular processes. The curriculum integrates biology, chemistry, physics, and quantitative analysis, with core coursework in biomolecular structure and function, metabolism, molecular biology, cell biology, genetics, and physical chemistry. Students develop strong analytical and experimental skills through laboratory work and mentored research, culminating in a senior thesis. As a dynamic, interdisciplinary field that is closely connected to medicine, biotechnology, and biomedical research, the Biochemistry & Molecular Biology major prepares graduates for careers in the life sciences or for advanced study in graduate programs, medical school, and other professional health fields. The degree is granted upon successful completion of credits specified here and on pages 51–52 (40 credits must be successfully completed in 3000- or 4000-level courses).

- **Scientific & Quantitative Literacy** courses in core curriculum: natural science courses CHE1021/1021L; mathematics course MAT2121.
- **Biochemistry & Molecular Biology majors** must receive a C- or better in all prerequisite courses. In addition, biochemistry majors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.

Required Courses 57 cr

BIO1011/1011L	Principles of Biology: Cells, Genes & Energy. . . .	.4
BIO1012/1012L	Principles of Biology: Organisms & Ecosystems . . .	.4
BIO3331/3331L	Biochemistry I: Biomolecular Structure & Function. . .	.4
BIO3332	Biochemistry II: Biomolecular Metabolism . . .	.3
BIO3335	Molecular Medicine	.3
BIO3337/3337L	Molecular Biology	.4
BIO3348/3348L	Cell Biology	.4
BIO4841/CHE4841	Research/Chemistry Research (1 cr per term) . . .	.2
BIO4875	Senior Thesis [OCE, WCE]	.2
CHE1022/1022L	Principles of Chemistry II	.4
CHE3101/3101L	Organic Chemistry I	.4
CHE3102/3102L	Organic Chemistry II	.4
CHE3321	Physical Chemistry	.3
MAT2122	Calculus and Analytic Geometry II	.4
PHY1101/1101L	Fundamentals of Physics I or	
PHY1201/1201L	Engineering Physics I	.4
PHY1102/1102L	Fundamentals of Physics II or	
PHY1202/1202L	Engineering Physics II	.4

Selectives 15 cr

BIO3115/3115L	Botany.	.4
BIO3116/3116L	Zoology.	.4
BIO3145/BIO3145L	Microbiology	.4
BIO3158/BIO3158L	Human Physiology	.4
BIO3159	Pathophysiology	.3
BIO3246/BIO3246L	Genetics	.4
BIO3236	Immunology	.3
BIO4359L	Biotechnology Lab	.2
BIO4841/CHE4841	Research (1 cr per term)	.1-4
At least 2 Selective courses must include laboratory.		

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Biology Major

Bachelor of Arts or Bachelor of Science

Biology majors include 3 unique courses of study. The B.A. Biology major provides a broad and flexible program that integrates biological knowledge with the liberal arts, supporting diverse career paths and interdisciplinary interests. The B.S. Biology majors offer more focused, intensive study, with a General Biology Track and a Pre-Medical/Pre-Professional Track. The General Biology Track offers a comprehensive and flexible science-based curriculum that prepares students for careers in the life sciences and for advanced study in graduate and professional programs. The Pre-Medical/Pre-Professional Track provides an intensive, science-focused curriculum designed to prepare students for medical, dental, and veterinary school, and other health-related professional programs, through a strong foundation in the biological, chemical, and physical sciences. Students majoring in biology will be prepared for any profession in the biological sciences: Clinical Health Sciences, including medical, dental, veterinary, physician assistant, doctor of nurse practitioner, public health, physical therapy, chiropractic, etc.; and research sciences, including biomedical industry, M.S. and Ph.D. programs in neurobiology, plant and environmental science, forensic science, genetics, and more. The degree is granted upon successful completion of credits specified here and on pages 51–52 (40 credits must be successfully completed in 3000- or 4000-level courses).

Biology (B.A.) (50 cr)

- **Scientific & Quantitative Literacy** courses in core curriculum: natural science course CHE1021/1021L; mathematics course MAT2055 or higher.
- **Biology majors**, must receive a C- or better in all prerequisite courses. In addition, biology majors and minors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.

Biology Core 18 cr

BIO1011/1011L	Principles of Biology: Cells, Genes & Energy	.4
BIO1012/1012L	Principles of Biology: Organisms & Ecosystems	.4
BIO3246/3246L	Genetics	.4
BIO4875	Senior Thesis [OCE, WCE]	.2
CHE3101/3101L	Organic Chemistry I	.4

Required Courses 8 cr

BIO3175/3175L	Ecology	.4
PHY1101/1101L	Fundamentals of Physics I or	
PHY1201/1201L	Engineering Physics I	.4

Selectives 24 cr

BIO, MAT, PHY, CHE, and SCI courses where BIO prefix course numbers are higher than 1009, CHE prefix course numbers are higher than 1021, and MAT prefix course numbers must be 2055 or higher.

BIO4841/CHE4841	Research	.1
Au Sable Institute courses		.1-8

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Biology (B.S.) (66 cr)

- **Scientific & Quantitative Literacy** courses in core curriculum: natural science course CHE1021/1021L; mathematics course MAT2055 or higher.
- **Biology majors**, must receive a C- or better in all prerequisite courses. In addition, biology majors and minors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.

Biology Core 18 cr

BIO1011/1011L	Principles of Biology: Cells, Genes & Energy*	.4
BIO1012/1012L	Principles of Biology: Organisms & Ecosystems	.4
BIO3246/3246L	Genetics	.4
BIO4875	Senior Thesis [OCE, WCE]	.2
CHE3101/3101L	Organic Chemistry I	.4

Required Courses 18 cr

BIO3115/3115L	Botany	.4
BIO3116/3116L	Zoology	.4
BIO3175/3175L	Ecology	.4
BIO4841/CHE4841	Research/Chemistry Research (1 per term)	.2
PHY1101/1101L	Fundamentals of Physics I or	
PHY1201/1201L	Engineering Physics I	.4

Selectives 30 cr

BIO1025	Medical Terminology	.2
BIO2015	Sustainable Urban Agriculture	.2
BIO2825/2825L	Honors Topics in Biology	.4
BIOX805	Topics in Biology	.3
BIO3145/3145L	Microbiology	.4
BIO3157/3157L	Human Anatomy	.4
BIO3158/3158L	Human Physiology	.4
BIO3159	Pathophysiology	.3

BIO3331/3331L	Biochemistry I: Biomolecular Structure & Function	.4
BIO3332	Biochemistry II: Biomolecular Metabolism	.3
BIO3236	Immunology	.3
BIO3276/3276L	Field Biology	.4
BIO3277/3277L	Conservation Biology	.4
BIO3335	Molecular Medicine	.3
BIO3337/3337L	Molecular Biology	.4
BIO3348/3348L	Cell Biology	.4
BIO4359L	Biotechnology Lab	.2
BIO4841/CHE4841	Research (1 cr per term; max 4 cr)	.1-4
CHE1022/1022L	Principles of Chemistry II	.4
CHE3102/3102L	Organic Chemistry II	.4
SCI1008	Introduction to Scientific Thought	.2
SCI1010/SCI1010L	Environmental Science	.4
Au Sable Institute courses		up to 12
Additional BIO-prefix courses	numbered 3100 or higher	
MAT-prefix courses	numbered 2055 or higher	

Students are encouraged to take additional BIO, MAT, PHY or CHE courses to count towards the general elective requirements and gain experience through research or internship opportunities.

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Pre-Medical/Pre-Professional Biology Concentration (B.S.) (75 cr)

- **Theological Philosophy** course in core curriculum: PHI2016.
- **Scientific & Quantitative Literacy** courses in core curriculum: natural science course CHE1021/1021L*; mathematics course MAT2121 or higher.
- **Biology majors**, must receive a C- or better in all prerequisite courses. In addition, biology majors and minors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, and PHY prefixes in order to graduate.

Biology Core 18 cr

BIO1011/1011L	Principles of Biology: Cells, Genes & Energy* .	.4
BIO1012/1012L	Principles of Biology: Organisms & Ecosystems.	.4
BIO3246/3246L	Genetics	.4
BIO4875	Senior Thesis [OCE, WCE]	.2
CHE3101/3101L	Organic Chemistry I*	.4

Required Courses 46 cr

BIO3158/3158L	Human Physiology*	.4
BIO3331/3331L	Biochemistry I: Biomolecular Structure & Function* ..	.4
BIO3335	Molecular Medicine	.3
BIO3348/3348L	Cell Biology	.4
BIO4065	MCAT Prep	.1
BIO4841/CHE4841	(1 cr per term)	.2
CHE1022/1022L	Principles of Chemistry II*	.4
CHE3102/3102L	Organic Chemistry II*	.4
MAT2055	Statistics or	
MAT2122	Calculus and Analytic Geometry II	.4
PHY1101/1101L	Fundamentals of Physics I* or	
PHY1201/1201L	Engineering Physics I*	.4
PHY1102/1102L	Fundamentals of Physics II* or	
PHY1202/1202L	Engineering Physics II*	.4
PSY2108	Lifespan Psychology	.4
PSY2105	Social Psychology or	
SOC1035	Introduction to Sociology	.4

Selectives 11 cr

BIO1025	Medical Terminology.	.2
BIO3116/3116L	Zoology	.4
BIO3145/3145L	Microbiology	.4
BIO3157/3157L	Human Anatomy*	.4
BIO3159	Pathophysiology	.3
BIO3175/3175L	Ecology	.4
BIO3236	Immunology	.3
BIO3332	Biochemistry II: Biomolecular Metabolism ...	.3
BIO3337/3337L	Molecular Biology	.4
BIO4359/4359L	Biotechnology Lab	.2
BIO4841/CHE4841	Research*/Chemistry Research* (1 cr per term) ..	1-4
Au Sable Institute courses	 up to 4	
At least 2 Selective courses must include laboratory.		

Students are strongly recommended to have a GPA of 3.5 or higher in order to be competitive for professional programs. Students are encouraged to work with their advisor in selecting additional BIO elective courses based in part on material covered in entrance exams and requirements for the student's desired professional program.

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* COURSES TYPICALLY NEEDED FOR THE MCAT OR MEDICAL SCHOOL RÉSUMÉ

Biology Minor.....16 cr

Required Courses: BIO1011/1011L, BIO1012, BIO2113/2113L; 4 credits selected from courses with BIO-prefix numbered 3000 or higher.

Biomedical Technology Minor.....20 cr

Required Courses: BIO1011/1011L, 3158/3158L, 4359, CHE1022/1022L, EGR4355; at least 3 credits selected from BIO3157/3157L, 4841, 4995, CHE3101/3101L, 4841, EGR4339, 4357, 4841, 4995, HSC4995.

Chemistry Minor 17–18 cr

Required Courses: CHE1021/1021L, 1022/1022L, 3101/3101L; one course selected from CHE3102/3102L, BIO3331/3331L, 3335.

Environmental Science Minor.....16 cr

Required Courses: BIO2113/2113L, 3175/3175L, SCI1010/1010L; 4 credits selected from BIO3276/3276L, 3277/3277L, approved topics courses, or department chair-approved courses from Au Sable Institute.

Science Minor.....16 cr

Required Courses: 16 credits in courses with BIO, CHE, or PHY prefixes (must include courses from at least two disciplines)

Science and Theology Minor.....20 cr

Required Courses:

- Two courses (8 credits) with BIO, CHE, PHY, or SCI prefix
 - 8 credits selected from BIA/BIB prefix (2–4 credits); BIO4841 (2–4 cr); BIO4995 (2–4 credits); PHI3035; PHI3805 (Topics); SCI1008; one additional BIO, CHE, PHY, or SCI prefix course (4 credits)
 - SCI3037
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Beta Beta Beta Biological Society

This prestigious National Biology Honors Society exists to provide educational and service opportunities to biology students. Membership is based upon sophomore class standing and earned GPA. Members plan and participate in society-sponsored activities such as guest speakers, career round-table discussions, field trips, research presentations, community service, and social gatherings.

Computer Science Major

Bachelor of Science

The Computer Science major is a four-year program designed to give students the knowledge to develop and use computer algorithms and computer-based systems. In addition, students learn computing and mathematical principles that are used in the analysis and design of such systems. Students are provided with the fundamentals of the mathematics of computers, computer programming, operating systems, database management, and computer security, all of which provide a firm foundation upon which to apply and research new technologies. The program includes training in four broad areas:

- Technical skills in programming and application development
- Applied mathematical skills for computations and simulations
- High-level design and analysis skills
- Application with databases, computer security, and communications

Students completing this program are prepared to function effectively in a variety of careers as software developers, information technology consultants, information technology analysts, database administrators, and systems analysts. Students are also prepared for rigorous graduate programs in the computing sciences. The degree is granted upon successful completion of credits specified here and on pages 51–52 (40 credits must be successfully completed in 3000- or 4000-level courses).

- **Scientific & Quantitative Literacy** mathematics course in core curriculum: C- or better in MAT2055.
- **Students must receive** a grade of C- or better in all COS, CYS, and MIS required courses. Courses with grades below C- must be repeated.

Core Requirements 12 cr

COS2005	Python Programming	4
COS2015	Principles of Computing or	
COS1011	Principles of Computing I and	
COS2112	Principles of Computing II	4
COS2062	Database Management	4

Computer Science Requirements..... 37 cr

COS3267	Operating Systems Concepts	4
COS3271	Programming I – Java	4
COS3272	Programming II – Mobile Application Development. .	4
COS4855	Project Capstone [OCE, WCE] or	
CYS4855	Senior Capstone [OCE, WCE]	2
CYS2081	Data Communications	4
CYS2269	Computer Security Fundamentals	4
CYS3065	Systems Analysis and Design	4
CYS3265	Tools and Techniques in Computer Science and Cybersecurity	4
MAT3225	Discrete Mathematics	2
MAT3226	Applications of Digital Logic	2
Select 3 credits* from the following:		
COS3001	C Programming Language	2
COS3025	Professional Certificate	1-3
COS4841	Research	1-3
COS4995	Computer Science Internship	1-3
CYS4995	Cybersecurity Internship	1-3
Additional 3000/4000 level COS or DAL courses		

*Students double-majoring in Cybersecurity must take 10 credits of selectives to meet the unique credit requirement. These electives cannot share with the Cybersecurity major.

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SEE PAGE 49 FOR EXPLANATION AND PREREQUISITES

Computer Science Minor16 cr

The computer science minor is designed to introduce students to applications of computer-based systems, the development of computer algorithms, and writing code in various computer languages.

Required Courses: COS2005, 3271, 3272; select 4 credits from COS courses numbered 2000 or higher.

Associate of Science in Computer Science (AU Online) (60 cr)

The Associate of Science in Computer Science is designed to give students the knowledge to develop and use computer algorithms and computer software. In addition, students learn computing and mathematical principles that are used in the design of such systems. Students are provided with the mathematic fundamentals of computers and computer programming. Students completing this program are prepared to function effectively as software developers and information technology consultants. A.S. graduates are able to transition into one of the existing B.S. programs or pursue an undergraduate degree at another institution. The degree is granted upon successful completion of credits specified here.

- All approved Traditional Undergraduate courses will apply to the corresponding category. Related transfer credits may apply if approved.
- **Scientific & Quantitative Literacy** courses in core curriculum: must include at least one mathematics course and one natural science course; social science courses are optional.

Core Curriculum 30–33 cr

Biblical Thinking & Living6–8 cr

Select 2 credits from the following:

BIA1015	Interpreting Scripture.....	.2
MIN2016	Biblical Interpretation for Study.....	.2

Select 2 credits from the following:

BIA1007	Christian Thinking and Living.....	.2
BIB1008	History of Redemption.....	.2
BIB2008	Survey of the New Testament.....	.2

Select 2–4 credits from the following:

PHI2005	Introduction to Philosophy.....	.4
PHI2016	Ethics.....	.4
PHI2055	Introduction to Theological Philosophy.....	.2
PHI3057	Christian Apologetics.....	.2

Leadership & Professionalism 2 cr

LDR3415	The Self-aware Leader.....	.2
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Effective Communication 3 cr

COM1075	Public Speaking.....	.3
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Critical Thinking & Information Literacy..... 4 cr

(reinforces Effective Communication outcomes)

ENG1107	College Writing & Research.....	.4
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Cultural & Global Engagement.....4 cr

HIS1005	Historical Perspectives on Culture, Belief, and Civilization.....	.4
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Creative Expression3–4 cr

(Art, Film, Literature, Music, or Theatre)

Any ART or LIT prefix or any of the below:

COM2008	Film Appreciation.....	.3
ENG2215	Writing Creative Nonfiction.....	.2
THE1055	Introduction to Theatre.....	.2

Scientific & Quantitative Literacy..... 8 cr

Select 2–6 credits from the following:

MAT2055	Statistics.....	.4
MAT2121	Calculus and Analytic Geometry I.....	.4
MAT3226	Applications of Digital Logic.....	.2

Select 2–6 credits from the following (lab not required):

Any BIO (excludes BIO1025), CHE, PHY, or SCI prefix

BIO2016	Our Changing Climate.....	.2
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Select credits from the following, if needed:

Any ANT, ECO, GEO, or SOC prefix or any of the below:

ICS2045	Socio-cultural Anthropology.....	.4
POS2005	U.S. National Government.....	.4
PSY1005	Introduction to Psychology.....	.4
PSY2108	Lifespan Psychology or	
PSY2005	Child and Adolescent Development and	
PSY2006	Adult Development.....	.4

Computer Science Specialization..... 24 cr

COS2005	Python Programming.....	.4
COS2015	Principles of Computing or	
COS1011	Principles of Computing I and	
COS2112	Principles of Computing II.....	.4
COS3271	Programming I – Java.....	.4
COS3272	Programming II – Mobile Application Development...	.4
CYS2081	Data Communications.....	.4
CYS3065	Systems Analysis and Design.....	.4

General Electives 3–6 cr

Associate of Science in Computer Science (TR On-Campus) (60 cr)

The Associate of Science in Computer Science is a two-year program designed to give students the knowledge to develop and use computer algorithms and computer software. In addition, students learn computing and mathematical principles that are used in the design of such systems. Students are provided with the fundamentals of the mathematics of computers and computer programming. Students completing this program are prepared to function effectively as software developers and information technology consultants. The degree is granted upon successful completion of credits specified here.

- **Scientific & Quantitative Literacy** mathematics course in core curriculum must be either MAT2055, MAT2121, or MAT3226 (recommended).

Core Curriculum 30–33 cr

Biblical Thinking & Living 8 cr

- BIA1007 Christian Thinking & Living (or BIB1826 honors)2
 BIA1015 Interpreting Scripture (or BIA1827 honors) or
 MIN2016 Biblical Interpretation for Study2
 Theological Philosophy (select from list on page 46)4

Effective Communication 3 cr

- COM1075 Public Speaking (or COM1825 Honors)3

Critical Thinking & Information Literacy 4–5 cr

(reinforces Effective Communication outcomes)

- ENG1107 College Writing & Research and, if required,
 ENG1107L College Writing & Research Lab or
 LAN1107L College Writing & Research Lab4-5

Cultural & Global Engagement. 4–5 cr

- HIS1005 Historical Perspectives on Culture, Belief, and Civilization
 (or HIS1825 Honors or HIS1826 Honors) and, if required,
 HIS1005L Historical Perspectives Lab4-5

Creative Expression 3–4 cr

Art, Film, Music, Literature, Theatre (select from list on page 47)

A MAXIMUM OF 2 CREDITS IN MUSIC ENSEMBLES OR THE1045 MAY APPLY

Scientific & Quantitative Literacy 8 cr

Mathematics, Natural Science, Social Science (select from list on page 47)
 MUST INCLUDE AT LEAST ONE MATHEMATICS AND ONE NATURAL SCIENCE COURSE.
 EXCLUDES BIO1025.

Computer Science Specialization 24 cr

- COS2005 Python Programming4
 COS2015 Principles of Computing or
 COS1011 Principles of Computing I and
 COS2112 Principles of Computing II4
 COS3271 Programming I – Java4
 COS3272 Programming II – Mobile Application Development... .4
 CYS2081 Data Communications4
 CYS3065 Systems Analysis and Design4

General Electives 3–6 cr

Cybersecurity Major

Bachelor of Science

The Cybersecurity major is designed to give students a strong academic experience in Cybersecurity as it permeates virtually all parts of technology today, providing information security, monitoring computer networks, and preventing and/or mitigating cyber threats. Cybersecurity professionals prescribe and use policies, procedures, and technology to address natural events, hackers, cyber terrorists, and technical problems that could compromise the confidentiality, integrity, or accessibility of systems and data. The degree is granted upon successful completion of credits specified here and on pages 51–52 (40 credits must be successfully completed in 3000- or 4000-level courses).

- **Scientific & Quantitative Literacy** mathematics course in core curriculum: C- or better in MAT2055.
- **Students must receive** a grade of C- or better in all COS, CYS, and MIS required courses. Courses with grades below C- must be repeated.

Core Requirements 12 cr

COS2005	Python Programming	4
COS2015	Principles of Computing or	
COS1011	Principles of Computing I and	
COS2112	Principles of Computing II	4
COS2062	Database Management	4

Cybersecurity & Information Systems Requirements. . 39 cr

COS3267	Operating Systems Concepts	4
CYS2081	Data Communications	4
CYS2269	Computer Security Fundamentals	4
CYS3065	Systems Analysis and Design	4
CYS3185	Server Administration	4
CYS3265	Tools and Techniques in Computer Science and Cybersecurity	4
CYS4245	Cybersecurity: Current Practices and Trends	4
CYS4369	Introduction to Cryptography	2
CYS4465	Computer Firewalls and Penetration Testing	2
CYS4466	Digital Forensics	2
CYS4855	Senior Capstone [OCE, WCE] or	
COS4855	Project Capstone [OCE, WCE]	2
MAT3226	Applications of Digital Logic	2

Selectives 1 cr*

COS4995	Computer Science Internship	1
CYS3025	Professional Certificate	1
CYS4841	Research	1
CYS4995	Cybersecurity Internship	1
Additional 3000/4000 level COS or DAL courses		

*Students double-majoring in Computer Science must take 6 credits of selectives to meet the unique credit requirement. These electives cannot share with the Computer Science major.

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Cybersecurity Minor18 cr

The cybersecurity minor is designed to add awareness of cyber security threats as well as tools and techniques for providing a solid defense against attacks for those in fields such as computer science, accounting, business, and criminal justice.

Required Courses: CYS2081, 2269, 3185, 4369, 4465, 4466.

Engineering Major

Bachelor of Science

Students in the Engineering major learn to apply fundamental knowledge of mathematics, science, and engineering to the creative development of solutions to complex technical problems. The core curriculum provides students with an understanding of ideas that have shaped human thinking in engineering and the humanities, arts, and sciences. This broad perspective gives students the context to comprehend the intentions of God's plan for human activity and realize the environmental, economic, ethical, sustainable, social, and safety impact of their engineering designs on creation and mankind. Graduates are well prepared to pursue employment in industry and to pursue graduate studies in engineering and related fields. The degree is granted upon successful completion of credits specified here and on pages 51–52 (40 credits must be successfully completed in 3000- or 4000-level courses).

The Bachelor of Science in Engineering program is accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org>), under the General Criteria.

- **Engineering students** must have a laptop computer capable of running applications in Windows (see department-specific recommendations at myUNW and viewing the Information Technology Services page).
- **Scientific & Quantitative Literacy** courses in core curriculum: mathematics course MAT2121; natural science course PHY1201/1201L.

Engineering Core 47 cr

CHE1021/1021L	Principles of Chemistry I	4
MAT2121	Calculus and Analytic Geometry I (SEE SCIENTIFIC & QUANTITATIVE LITERACY REQUIREMENT ABOVE)	4
MAT2122	Calculus and Analytic Geometry II	4
MAT3223	Calculus and Analytic Geometry III	4
MAT3252	Statistics for Engineering	4
MAT3335	Differential Equations with Applied Linear Algebra	4
PHY1201/1201L	Engineering Physics I (SEE SCIENTIFIC & QUANTITATIVE LITERACY REQUIREMENT ABOVE)	4
PHY1202/1202L	Engineering Physics II	4
EGR1005	Introduction to Engineering	4
EGR2105	Statics	3
EGR2206	Introduction to Engineering Analysis	4
EGR2207	Thermodynamics	3
EGR3115	Materials Science	3
EGR4311	Engineering Design I [WCE]	3
EGR4312	Engineering Design II [OCE]	3

Concentration 30–33 cr

Select a concentration. Requirements are listed below.

Chemical Engineering Concentration (33 cr)

CHE1022/L	Principles of Chemistry II	4
CHE3101/L	Organic Chemistry I	4
EGR3307	Chemical Engineering Thermodynamics	3
EGR3309	Reaction Kinetics and Reactor Design	3
EGR3225	Fluid Mechanics	3
EGR2107	Intro to Circuits	3
EGR3215	Control Systems	3
EGR3326	Mechanical Engineering Materials Laboratory	2
EGR3327	Heat Transfer	3
EGR3328	Thermal-Fluids Lab	2

Technical electives 3

Select from EGR-prefix courses at the 3000 or 4000 level. Students may not receive credit toward the major for both EGR3246 and EGR3326. A maximum combined 4 credits allowed from EGR4841 and EGR4995.

Civil Engineering Concentration (30 cr)

EGR2145	Surveying Fundamentals Laboratory	2
EGR2205	Mechanics of Materials	3
EGR2209	Dynamics	3
EGR3225	Fluid Mechanics	3
EGR3245	Structural Analysis	3
EGR3246	Civil Engineering Materials Laboratory	2
EGR3347	Geotechnical Engineering	3
EGR3348	Soils Testing Laboratory	2
SCI1010/1010L	Environmental Science	4

Technical Electives 5

Select from EGR-prefix courses at the 3000 or 4000 level. Students may not receive credit toward the major for both EGR3246 and EGR3326. A maximum combined 4 credits allowed from EGR4841 and EGR4995.

Electrical Engineering Concentration (30 cr)

COS3001	C Programming	2
EGR2107	Introduction to Electronics and Electrical Circuits	3
EGR2108	Electronics and Electrical Circuits Laboratory	2
EGR3215	Control Systems	3
EGR3235	Electronic Devices	4
EGR3236	Digital Electronics Laboratory	2
EGR3335	Microcontrollers Laboratory	2
EGR3337	Signals & Systems	3
EGR3338	Communication Systems Laboratory	2
MAT3226	Applications in Digital Logic	2

Technical Electives 5

Select from EGR-prefix courses at the 3000 or 4000 level. Students may not receive credit toward the major for both EGR3246 and EGR3326. A maximum combined 4 credits allowed from EGR4841 and EGR4995.

Mechanical Engineering Concentration (30 cr)

EGR2107	Introduction to Electronics and Electrical Circuits . . .	3
EGR2108	Electronics and Electrical Circuits Laboratory	2
EGR2125	Design and Manufacturing Laboratory	2
EGR2205	Mechanics of Materials	3
EGR2209	Dynamics	3
EGR3215	Control Systems	3
EGR3225	Fluid Mechanics	3
EGR3326	Mechanical Engineering Materials Laboratory	2
EGR3327	Heat Transfer	3
EGR3328	Thermal-Fluids Laboratory	2

Technical Electives 4
 Select from EGR-prefix courses at the 3000 or 4000 level. Students may not receive credit toward the major for both EGR3246 and EGR3326. A maximum combined 4 credits allowed from EGR4841 and EGR4995.

General Engineering Concentration (30 cr)

EGR2107	Introduction to Electronics and Electrical Circuits . . .	3
EGR2108	Electronics and Electrical Circuits Laboratory	2
EGR2205	Mechanics of Materials	3
EGR3215	Control Systems	3

Select one of the following:

COS3001	C Programming	2
EGR2125	Design and Manufacturing Laboratory	2
EGR2145	Surveying Fundamentals Laboratory	2

Technical Electives 17
 Select from EGR-prefix courses at the 3000 or 4000 level. Students may not receive credit toward the major for both EGR3246 and EGR3326. A maximum combined 4 credits allowed from EGR4841 and EGR4995.

WCE = WRITTEN COMMUNICATION EMPHASIS.
 OCE = ORAL COMMUNICATION EMPHASIS.
 SEE PAGE 49 FOR EXPLANATION AND PREREQUISITES.

Health Sciences Major

Bachelor of Arts

Within a Christian liberal arts education, the study of health science is grounded in a commitment to care for the whole person and to serve others through knowledge of human health and wellness. The Health Science major is designed for students planning to pursue graduate or professional training in health-related fields, such as Master's in nursing, physician assistant, physical therapy, nutrition, and public health. The degree is granted upon successful completion of credits specified here and on pages 51–52 (40 credits must be successfully completed in 3000- or 4000-level courses).

- **Theological Philosophy** course in core curriculum: PHI2016
- **Scientific & Quantitative Literacy** courses in core curriculum: natural science course BIO1011/1011L; mathematics course MAT2055.
- **Health Sciences majors** must receive a C- or better in all prerequisite courses. In addition, Health Sciences majors must have a cumulative grade point average of at least 2.0 in all courses with BIO, CHE, HPE, and HSC prefixes in order to graduate.

Required Courses 41 cr

BIO1025	Medical Terminology	2
BIO3145/3145L	Microbiology	4
BIO3157/3157L	Human Anatomy	4
BIO3158/3158L	Human Physiology	4
BIO3159	Pathophysiology	3
BIO4995	Internship	2
CHE1021/1021L	Principles of Chemistry I	4
CHE1022/1022L	Principles of Chemistry II or	
CHE3101/3101L	Organic Chemistry I	4
HPE3006	Human Nutrition	4
HSC4875	Senior Thesis [OCE, WCE]	2
PSY1005	Introduction to Psychology	4
PSY2108	Lifespan Psychology	4

Selectives 9 cr

BIO, CHE, HPE, KIN, or PHY prefix courses, or other courses approved by the School of Science and Engineering. BIO and CHE courses numbers must be higher than 1009.

Work experience as a Certified Nursing Assistant is highly recommended.

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Health Sciences Minor 24 cr

Required Course: BIO1011/1011L; select 20 credits from the following: BIO, CHE, HPE, KIN, PHY, PSY, or SOC prefix courses, or MAT2121, MAT2122. Neither BIO- nor CHE- courses numbered 1009 or lower may be counted in the minor.

Mathematics Education Major see Department of Teacher Education

Mechanical Engineering Major

Bachelor of Science

The Bachelor of Science in Mechanical Engineering curriculum provides students with a varied and balanced educational experience through a combination of theoretical concepts and practical applications taught within the context of a Christian worldview. A unique combination of mathematics, sciences, and engineering topics, together with the core curriculum of communications, humanities, social sciences, and Biblical studies, prepares students for professional engineering positions in the field of mechanical engineering. The program focuses on key areas of mechanical engineering including mechanical design, control systems, and thermal sciences. Students learn to analyze, design, build, and test mechanical components, devices and systems. Graduates are well prepared to pursue employment in industry or graduate studies in mechanical engineering. The degree is granted upon successful completion of credits specified here and on pages 51–52 (40 credits must be successfully completed in 3000- or 4000-level courses).

- **Engineering students** must have a laptop computer capable of running applications in Windows (see department-specific recommendations at myUNW and viewing the Information Technology Services page).
- **Scientific & Quantitative Literacy** courses in core curriculum: mathematics course MAT2121; natural science course PHY1201/1201L.

Required Courses 82 cr

CHE1021/1021L	Principles of Chemistry I/Laboratory.....4
MAT2121	Calculus and Analytic Geometry I
(SEE SCIENTIFIC & QUANTITATIVE LITERACY REQUIREMENT ABOVE)	
MAT2122	Calculus and Analytic Geometry II.....4
MAT3223	Calculus and Analytic Geometry III.....4
MAT3335	Differential Equations & Applied Linear Algebra..4
MAT3252	Statistics for Engineering.....4
PHY1201/1201L	Engineering Physics I/Laboratory
(SEE SCIENTIFIC & QUANTITATIVE LITERACY REQUIREMENT ABOVE)	
PHY1202/1202L	Engineering Physics II/Laboratory.....4
EGR1005	Introduction to Engineering.....4
EGR2206	Introduction to Engineering Analysis.....4
EGR2207	Thermodynamics.....3
EGR2105	Statics.....3
EGR2209	Dynamics.....3
EGR3115	Materials Science.....3
EGR4311	Engineering Design I [WCE].....3
EGR4312	Engineering Design II [OCE].....3

EGR2125	Design & Manufacturing Lab.....2
EGR2205	Mechanics of Materials.....3
EGR2107	Intro to Circuits.....3
EGR2108	Electronic Lab.....2
EGR3205	Machine Design.....3
EGR3225	Fluid Mechanics.....3
EGR3215	Control Systems.....3
EGR3326	Mechanical Engineering Materials Laboratory...2
EGR3327	Heat Transfer.....3
EGR3328	Thermal-Fluids Lab.....2

Selective Technical electives..... 6
 Select from EGR-prefix courses at the 3000 or 4000 level. Students may not receive credit toward the major for both EGR3246 and EGR3326. A maximum combined 4 credits allowed from EGR4841 and EGR4995.

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