2020-2021 Vermont Tech Course Catalog

Foreword

Vermont Tech is part of the Vermont State Colleges System (VSCS) that includes Castleton University, Northern Vermont University, and the Community College of Vermont. The college offers collegiate-level programs in agriculture; business; engineering technologies; applied technologies; health professions; and renewable energy.

Mission Statement

We provide career-focused technical and professional education in a caring community which prepares students for immediate workplace success and continued learning.

Institutional Values

Vermont Tech emphasizes the core values of dedication, integrity, and responsibility as a foundation for learning, career preparation, and citizenship. The college is dedicated to its tradition of helping students reach their full potential by developing their academic and scholarly proficiency; critical thinking and communication skills; civic responsibility; and global awareness.

The faculty, staff, administration, and students at Vermont Tech are committed to forming a stimulating, compassionate, and supportive learning community which fosters the personal and professional growth of all members.

Vermont Tech values its role in supporting the Vermont economy and meeting the needs of businesses by preparing highly qualified graduates in various occupations, as well as by providing businesses with opportunities for continuing education for their employees.

Academic Recognition

By authority conferred by the Vermont legislature, the Trustees of the VSCS have authorized Vermont Tech to grant the degrees of associate of applied science, associate of science, associate of engineering, bachelor of science, and master of science with a major in the program pursued.

The Vermont Academy of Science and Technology (VAST) at Vermont Tech has Independent School Approval for grade 12 from the Vermont State Board of Education.

Vermont Tech is an institutional member of the New England Commission of Higher Education, the Vermont Higher Education Council, and the American Society for Engineering Education.

Accreditation

Vermont Tech is accredited by the New England Commission of Higher Education (NECHE).

The following programs are accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org: Architectural & Building Engineering Technology; Architectural Engineering Technology; Civil & Environmental Engineering Technology; Computer Engineering Technology; Electrical Engineering Technology; Electromechanical Engineering Technology; Manufacturing Engineering Technology; Mechanical Engineering Technology.

The Automotive Technology program is accredited by the National Automotive Technicians Education Foundation (NATEF) (ASE), 101 Blue Seal Dr, SE, Suite 101, Leesburg, VA 20175.

The Dental Hygiene associate degree program is accredited by the Commission on Dental Accreditation, 211 East Chicago Ave, Chicago, IL 60611-2678, (312) 440-4653.

The Practical Nursing (system-wide, distance education), Associate Degree in Nursing (system-wide, distance education), and Bachelor of Science in Nursing (RN-BSN, distance education) programs are accredited by the National League for Nursing Commission for Nursing Education Accreditation (NLN CNEA) located at 2600 Virginia Avenue, NW, Washington, DC 20032, 202-909-2526

The Respiratory Therapy program is accredited by the Commission on Accreditation for Respiratory Care, 1248 Harwood Rd, Bedford, TX 76021-4244, 817-283-2835. http://www.coarc.com.

The Veterinary Technology program is accredited as a program for educating veterinary technicians by the American Veterinary Medical Association, 1931 North Meacham Rd, Suite 100, Schaumburg, IL 60173.

Locations

Randolph Center Campus
Williston Campus
Telepresence
Bennington Campus
Brattleboro Campus
Dartmouth Site
Johnson/Morrisville Site
Keene/Monadnock Site
Littleton/Lancaster Site
Lyndon Site
Middlebury Site
Newport Site
Rutland Site
St. Albans Site
White River Junction Site

Notice of College Regulations

The information contained in this catalog is current at the time of publication and subject to change at any time. The regulations included in this catalog and other official college statements are binding on all students. The college reserves the right to change any of the regulations or curriculum at any time. Students have had sufficient notice of all official regulations when such are contained in official publications or posted on the college's website: vtc.edu.

Non-Discrimination & Equal Opportunity Statement

Every member of Vermont Tech should work to ensure non-discriminatory processes and practices with faculty, staff, and students. Qualified students are recruited for, admitted to, and participate in all college programs without discrimination on the basis of race, color, sex, sexual orientation, religion, creed, national origin, age, veteran status, or disability. Vermont Tech provides reasonable accommodations to create equal opportunities for students with documented disabilities.

Faculty, administrators, and staff are employed without discrimination on the basis of race, color, sex, sexual orientation, religion, creed, national origin, age, veteran status, or disability unrelated to job requirements. Vermont Tech makes reasonable accommodations to the known disability of an otherwise qualified applicant or employee.

Additionally, the Vermont State College System (VSCS) engages in affirmative efforts to recruit, admit, and support students and to recruit, employ, and support employees in order to achieve the diversity which advances the educational mission.

The VSCS complies with state and federal laws related to equal opportunity and non-discrimination. Any questions or complaints about potential or perceived discrimination in violation of any state or federal law should be directed to: the Vermont Tech Ombudsperson, the VSCS Office of the Chancellor, the Vermont Office of the Attorney General, or the federal Equal Opportunity Employment Commission.

If auxiliary aid or service is needed to apply for admission or employment, please contact Vermont Tech's Human Resources Director at (802) 728-1211. For questions related to Title IX, please contact the Title IX coordinator via mail at PO Box 500, Randolph Center, Vermont 05061.

Academic Calendars 2020-2021

2020 FALL TERM

Sunday	**August 23**	Academic Day: student advising/department meetings
Monday	**August 24**	Classes begin for all students on all campuses (remote unless otherwise stated in certain programs)
Friday	**September 4**	Add/drop period ends
Friday	**September 25**	Early warnings due
Friday	**October 9**	Deadline for make-up of *I* grade from summer
Thursday	**October 22**	Last day to drop with *W* (60% point)
Monday	**November 2**	Registration for spring begins
Monday	**November 2**	Student faculty evaluation period begins
Friday	**November 20**	Registration for spring ends
Friday	**November 20**	Last day of any in-person classes for term
Monday	**November 23**	Thanksgiving break begins
Monday	**November 30**	Classes resume remotely
Friday	**December 4**	Last day of classes for term
Friday	**December 4**	Student faculty evaluation period ends
Friday	**December 4**	Fall and spring graduation applications due
Monday	**December 7**	Final exams and presentations week begins
Friday	**December 11**	Final exams and presentations week ends
Sunday	**December 13**	Final grades due
Tuesday	**December 15**	Final grades posted

2021 SPRING TERM

Friday	**January 15**	Classes begin
Monday	**January 18**	Martin Luther King Day: no classes
Friday	**January 29**	Add/drop period ends
Friday	**February 19**	Early warnings due
Monday	**February 22**	Vacation week begins
Monday	**March 1**	Classes resume
Friday	**March 12**	Deadline for make-up of *I* grade from fall
Thursday	**March 25**	Last day to drop with a *W* (60% point)
Monday	**March 29**	Registration for summer and fall begins
Monday	**April 5**	Vacation week begins
Monday	**April 12**	Classes resume
Monday	**April 12**	Student faculty evaluation period begins
Friday	**April 23**	Registration for summer and fall ends
Friday	**May 7**	Last day of classes for term
Friday	**May 7**	Student faculty evaluation period ends
Monday	**May 10**	Final exams and presentations week begins
Friday	**May 14**	Final exams and presentations week ends
Friday	**May 14**	Deadline for make-up of *I* grade from spring 2020
Saturday	**May 15**	Commencement
Sunday	**May 16**	Health Professions Commencement
Sunday	**May 16**	VAST graduation
Sunday	**May 16**	Final grades due
Tuesday	**May 18**	Final grades posted

2020 FALL PN TERM

Monday	**August 24**	Classes begin for all students on all campuses
Friday	**September 4**	Add/drop period ends
Monday	**September 7**	Labor Day: no classes
Friday	**September 25**	Early warnings due
Friday	**October 9**	Deadline for make-up of I grade from spring or summer
Monday	**October 12**	Columbus Day: no classes
Tuesday	**October 20**	Last day to drop with W (60% point)
Tuesday	**November 10**	Student faculty evaluation period begins
Monday	**November 16**	Registration for winter begins
Wednesday	**November 25**	Thanksgiving recess begins
Friday	**November 27**	Registration for winter ends
Monday	**November 30**	Classes resume
Friday	**December 4**	Last day of classes for term
Friday	**December 4**	Student faculty evaluation period ends
Sunday	**December 6**	Final grades due
Tuesday	**December 8**	Final grades posted

2020 WINTER PN TERM

Monday	**December 7**	Classes begin
Monday	**December 21**	Holiday recess begins
Monday	**January 4**	Classes resume
Monday	**January 18**	Martin Luther King Day: no classes
Friday	**January 22**	Early warnings due
Friday	**January 22**	Deadline for make-up of I grade from fall
Thursday	**February 18**	Last day to drop with a W (60% point)
Monday	**February 22**	Vacation week begins
Monday	**March 1**	Registration for spring2 begins
Monday	**March 1**	Classes resume
Friday	**March 12**	Registration for spring2 ends
Tuesday	**March 16**	Student faculty evaluation period begins
Monday	**April 5**	Vacation week begins
Monday	**April 12**	Classes resume
Friday	**April 16**	Student faculty evaluation period ends
Friday	**April 16**	Last day of classes for term
Sunday	**April 18**	Final grades due
Tuesday	**April 20**	Final grades posted

2021 SPRING2 PN TERM

Monday	**April 19**	Classes begin
Friday	**April 30**	Graduation applications due
Friday	**May 14**	Early warnings due
Monday	**May 24**	Last day to drop with a W (60% point)
Friday	**May 28**	Deadline for make-up of I grade from winter
Monday	**May 31**	Memorial Day: no classes
Tuesday	**June 8**	Student faculty evaluation period begins
Thursday	**June 17**	Last day of classes for term
Thursday	**June 17**	Student faculty evaluation period ends
Saturday	**June 19**	Commencement
Saturday	**June 19**	Final grades due
Monday	**June 21**	Final grades posted

Admissions

Application Deadlines

Vermont Tech has a policy of rolling admission for most majors. We process applications throughout the year until we determine that we have filled each term's class and may close admission once the class is filled. Applicants are notified promptly of their admission status after a review of their complete file.

Admission to some programs is exceptionally competitive. Deadlines for application to these programs are below. After the initial round of reviews, complete files are reviewed on a rolling admission, space-available basis.

Dental Hygiene, Practical Nursing, Radiologic Science, & Veterinary Technology	December 1
Associate Degree Nursing	March 15
VAST	June 1

Standardized Testing

All freshman applicants must take either the SAT I, ACT, or Accuplacer. Applicants already out of high school may be required to take Accuplacer. The College Entrance Examination Board code for Vermont Tech is 3941. The ACT code number is 4323.

Applicant Requirements

All applicants should submit a completed application with the application fee and a personal statement between 250 and 500 words discussing why they're pursuing a degree at Vermont Tech or another topic of their choice. VAST applicants should submit an essay in lieu of the personal statement. Other requirements are listed below.

First-Year

- Official high school transcript with at least the first marking period grades of the senior year or official scores from a high school equivalency exam (GED)
- SAT I, ACT, or Accuplacer results

Transfer

- Official high school transcript or official scores from a high school equivalency exam (GED)
- Official transcripts from all colleges previously attended
- Official transcripts from any other VSCS school attended prior to summer 2002

If an applicant attended another VSCS school prior to summer 2002 or any college outside the VSCS, Vermont Tech requires official transcripts. These should be sent directly to Admissions from the college at the time of application. Transcript evaluations are available upon request.

Credit for applicable college courses completed may be granted for those courses taken at a regionally accredited institution with a grade of *C*- or better or *C* for any science course completed in the last ten years that's required for Dental Hygiene, Nursing, Radiologic Science, or Respiratory Therapy. Transferred grades aren't computed into a student's GPA. Courses taken at an accredited institution on a pass/fail basis may be transferred. Vermont Tech may require the student to obtain a grade equivalent in the course. Exams may be required to show competence in subject material.

Vermont Tech is the final judge as to what transfer credit it accepts depending upon factors such as the student's academic record, the institution attended, and the program selected.

Earned VSCS credits are transferable to other institutions at their discretion.

Health Professions

- Official high school transcript or official scores from a high school equivalency exam (GED)
- Official transcripts from all colleges previously attended
- SAT I or ACT results, if available

- Vermont Tech placement test scores
- Two letters of recommendation dated within the past six months and submitted directly to Admissions. Letters should address work ethic, communication skills, potential for adaptation to a fast-paced clinical environment, and potential to competently and compassionately deliver healthcare to patients across the lifespan. Letters from family members or friends can't be accepted.
- Current Basic Life Support for Healthcare Providers CPR certification *(Nursing & Paramedicine)*

All Dental Hygiene, Nursing, Radiologic Science, and Respiratory Therapy students are required to pass a background check prior to June 1 *(see policy below)*.

Additional Requirements for Dental Hygiene
Accepted Dental Hygiene students must complete a four-hour observation in a dental office.

Additional Requirements for Nursing, Associate Degree

- An unencumbered PN license
- Vermont Tech PN graduates must have transferable credits in Anatomy & Physiology *(8 credits)*, Nutrition *(3 credits)*, and Human Growth & Development *(3 credits)* and a GPA of at least 3.0 in PN coursework *(BIO 2120, ENG 1061, MAT 1040, PSY 1010, or an approved AH elective may be taken after graduation to improve GPA)*
- Graduates of a non-college PN program must submit a program transcript
- Current PN students must have a GPA of at least 3.0 each term and proof of passing the PN NCLEX
- At least one letter of recommendation must be from someone in the nursing field

PN students attempting to complete courses for the ADN program may not enroll in spring or summer courses at any VSCS institution until their spring2 term is complete.

Additional Requirements for Nursing, Bachelor's Degree

- An unencumbered RN license

For non-VTC applicants, see Program Prerequisites.

Additional Requirements for Paramedicine Certificate

- Valid EMT license
- Letters of reference should be from ALS providers familiar with the applicant's character, abilities, and capability to succeed

Additional Requirements for Respiratory Therapy
Respiratory Therapy applicants must have 8 transferable credits in Anatomy & Physiology.

Nursing Direct Progression Policy
Qualified accepted PN or ADN students may progress directly to the next level nursing program at Vermont Tech without reapplying. See the Nursing pages for more information.

Nursing Policy for Criminal Background Checks & Drug Screening
To ensure the safety of all patients under the care of Vermont Tech nursing students and all faculty and students, all nursing students must have criminal background checks (CBCs) which include FBI fingerprinting. A CBC must be completed and reviewed prior to the first day of class. In the event that the student is admitted late, the CBC must be completed and reviewed prior to any clinical experience. Any student who fails to comply with this process is dropped from the program. The school uses the CBC for screening purposes and to secure clinical placements. In the event that there are positive findings (either convictions on the CBC or positive drug screen results at the sites that require them), the Associate Dean of Nursing and a member of the administration review all provided documentation and meet with the student to determine enrollment status. The student must provide a written explanation of all convictions and positive drug screens prior to this meeting. Court documents must be provided that detail the disposition of the case. Failure to do so results in dismissal from the program.

The student must report any convictions that occur after the CBC while enrolled in school.

A third-party vendor conducts the CBC and drug screens and maintains the records. Accepted students receive instructions on when and where to complete the CBC.

International

- Official secondary school and college/university transcripts (if applicable) with course-by-course evaluation by an international transcript evaluator
- Testing: official TOEFL score (if English isn't the first language) with a minimum score of 500 for paper, 173 for computer, or 61 for internet. IELTS with a recommended minimum score of 5.5 for engineering, health professions, and aviation and a minimum score of 5 for business, computer, construction, and plant or animal sciences. Pearson with a recommended score of 44 or higher
- Official financial statement on bank letterhead indicating ability to pay one full year of tuition, room, and board.
- A copy of the passport information page with complete name, date of birth, and countries of birth and citizenship

We encourage international students to apply between November and April due to the lengthy visa process. Upon acceptance, international students must submit a $300 deposit before we issue an I-20. The deposit is credited to the first term bill.

Graduate

- Official transcripts from all colleges previously attended
- GRE results

VAST

- Official high school transcript with at least the first marking period grades of the junior year or a home school plan
- PSAT, SAT I, or ACT results
- Two letters of recommendation *(one from a teacher, one from a school counselor or principal)*
- Personal interview
- College-administered placement test
- Essay that addresses: what do you envision yourself doing ten years from now? How do you think attending the Academy will help you reach these goals? What can you contribute to the Vermont Tech community? A significant event in your life and how it has affected you

Entry into VAST is competitive. Applicants should have a strong academic transcript and one of three standardized tests with scores in the following ranges:

- PSAT/SAT scores of 500 for each subsection
- ACT scores of 21 for each subsection

VAST is recognized as an approved independent high school and awards diplomas. Because the state allows VAST students to transfer credits back to their sending high schools, students may receive a second high school diploma from that school.

A Vermont student's general state support grant may be used to cover VAST tuition. Vermont Tech provides financial aid to residents for any gap between the state grant and tuition, enabling Vermonters to attend VAST tuition-free. Other fees are the student's responsibility.

Acceptance decisions are made on a rolling basis.

A student is eligible for a VAST diploma when they have a minimum of 2.0 GPA and meet the minimum number of credits as required by the state of Vermont.

VAST students must adhere to all policies and procedures outlined in the student handbook.

Upon completion of the program, students may remain at Vermont Tech to complete a degree.

Program Prerequisites

We have a complete list of program prerequisites and recommendations on our website.

Advance Standing

Vermont Tech may grant advance standing in a degree program by transfer of courses from other accredited post-secondary institutions; advance placement or challenge exams; recognized equivalent military courses; or previous relevant experience.

Consideration of experience for credit is initiated by receipt of a completed academic portfolio by the Department Chair via Academic Affairs. If approved, the portfolio is forwarded to the Registrar with signatures of approval from the Department Chair, the credit-granting department, and the Academic Dean. The college may require a challenge exam.

Advanced standing toward a degree program is subject to the following restrictions:

- No more than 50% of the total required credits may be obtained by advanced standing for an associate degree or the +2 portion of a bachelor's degree
- No more than 50% of the total major technical course credits in an academic program may be obtained by advanced standing.

Dual Enrollment

Dual enrollment programs allow a student to take college courses while still in high school. Programs may be found at the home high school, a regional technical center, or a college campus.

Placement Testing

Some applicants may require placement tests in English and mathematics. Test results are used for course placement and admission purposes. If a student's skills are below minimum levels, they must take developmental courses in appropriate areas. This results in additional coursework and longer overall enrollment. A student has the right to retest one time if they're dissatisfied with their original score.

A student who has completed a bachelor's degree at a regionally accredited US college or university or has met the English and mathematics program requirements may be exempted.

Deposits

Accepted students must remit a tuition deposit of $200 by May 1 for the fall or December 15 for the spring. After these dates, we accept deposits on a space-available basis. The tuition deposit is credited toward the first term's bill and is non-refundable after May 1.

If a student intends to live on campus, a $100 room deposit must be paid by May 1 (or within two weeks if accepted after May 1) with a completed Housing Contract. For returning students, room deposits are due in early April. Deposits are non-refundable after May 1. Housing deposits are placed in a holding account until the end of the spring term, at which time they're placed on a student's account and go toward any dorm damage fines that may be incurred. Any amount not used is refunded to the student at the end of May. If a balance remains on the student's account, the deposit is applied to the balance.

Vermont Residency

For Determination of In-State Residency for Tuition Purposes, see VSC Policy 301.

Vermont Tech participates in the Regional Student Program (RSP) of the New England Board of Higher Education. Under this agreement, students from New England states pay 150% of the in-state tuition when they enter an eligible program under the RSP pact. A program not generally eligible because it's also offered in a student's home state may be eligible if the student's legal residence is closer to Vermont Tech than to the home state institution. State eligibility is subject to change without notice. For a full list of eligible states and majors for both RSP and the Good Neighbor Policy, visit our website.

Readmission

You may apply for readmission if:

- You've been a matriculated student within the last three years but haven't attended Vermont Tech for a year or more
- You're a previously matriculated student who left while on probation or were academically dismissed within the last three years
- You're a previously matriculated student in Associate Degree Nursing, Practical Nursing, Dental Hygiene, Radiologic Science, Respiratory Therapy, or Veterinary Technology and have been absent from the program for any length of time
- You applied within the previous two years but didn't matriculate (updated supporting documents may be requested)

To apply for readmission, the applicant must complete a Readmission Application. Completion of this application doesn't guarantee admission. Contact Admissions for more information and to determine eligibility.

A student who attended Vermont Tech within the last year doesn't need to apply for readmission. They may contact their advisor or the Registrar for re-enrollment.

Nursing Re-entry
See the Nursing Student Handbook.

Respiratory Therapy Re-entry
If an applicant wants to re-enter the Respiratory Therapy program after one term, they must perform a demonstration of all skills learned in the appropriate labs and clinical courses from the year before prior to re-entry. If the applicant is unable to perform these skills satisfactorily, they aren't readmitted to the program. Students who have been out of the program for more than a term must repeat all RSP courses in the program curriculum.

Non-Degree Students

A student who wishes to enroll in courses but not a degree program must meet all of the prerequisites for the courses and is subject to the same academic regulations and standards as a degree student.

Registration for courses is subject to availability, with initial priority given to degree students. Non-degree students register for classes through the Registrar. There's no online registration for non-degree students nor are they eligible for federal financial aid.

Academic Affairs

Academic Policies

No.	Name	Contents
T101	**Academic Affairs Policy**	Academic standing, probation, dismissal, academic appeals, graduation requirements, graduation participation requirements, honors, time limits on graduation, graduation standards
T103	**Grading System & GPA Calculation**	Grading system, calculating GPA, incomplete course work, auditing, transfer credit, challenge exams, withdrawal, repeating courses, change of grade, grade amelioration/forgiveness
T104	**New Courses**	Process for creation and review of new curriculum
T106	**Advance Standing**	Institutional credit, transfer credit, challenge exam credit, portfolio/life/military credit, advanced placement credit, course substitution of credit
T107	**Cheating & Plagiarism**	Academic honesty, appeals
T109	**Off-Campus Credit Courses & Programs**	Approval of courses, student readiness, instructor evaluation, student evaluation
T113	**Students with Disabilities**	Documentation guidelines, determining/providing accommodations, appeals, confidentiality
T114	**Overload Study**	Credit overload definition & procedure
T115	**The Family Education Rights & Privacy Act**	FERPA policy & procedures, definition of directory information
T116	**Medical Withdrawal/Return**	Procedures for voluntary or involuntary medical absences
T117	**Academic Program Development & Review**	New program development process, program review, termination of academic degree programs, questionnaires in appendix
T118	**Secondary School Students in Credit Courses**	Policy to allow secondary school students to enroll as non-degree students
T121	**Graduation Standards**	Standards policy for writing, oral communication, quantitative reasoning, information literacy
T122	**Electronic Devices in Classrooms**	Policy for use of electronic devices in the classroom
T309	**Curriculum Planning & Scheduling**	Curriculum changes, scheduling process, schedule revisions, room scheduling, registration/deregistration procedures
T315	**Graduation Participation**	Procedures for participation in commencement
T317	**Student Withdrawal Process**	Procedures, responsibilities
T702	**Hartness Library Archives Collection**	Archives mission & services, retention of materials

Academic Advising

Vermont Tech provides comprehensive advising to enrich the educational experience of every student. Students should meet with their assigned advisors throughout the year to discuss their progress and future plans. If students need to change advisors, they should contact the Registrar.

Students who are having academic or personal difficulties may get extra help from faculty advisors to identify problem areas; clarify educational and personal goals; resolve difficulties; and obtain referrals to campus services such as the Center for Academic Success.

Attendance & Assignment Requirements

Students must meet the attendance and assignment requirements set by the instructor for each class in which they're enrolled. Failure to meet these requirements may result in removal with a failing grade. In cases of excessive absences and upon the recommendation of the instructor, a student may be dismissed from the college with failing grades.

The make-up of any work is at the discretion of the instructor. Any time a student misses a class, exam, lab, or other scheduled event, it's the student's responsibility to inform the instructor and to make satisfactory arrangements for any make-up work.

Participation in varsity athletic contests may be considered excused absences. Practices aren't excused absences. Athletes are responsible for all work missed; the instructor and athlete will make every reasonable effort to establish an acceptable make-up procedure. If no reasonable make-up alternative is possible, academic standing has priority.

Auditing Courses

Students may audit a Vermont Tech course, provided they have met all course prerequisites, have obtained the permission of the instructor, and there is space available. Audit course credit hours aren't applied to student credit load or status.

In giving permission for an audit, instructors specify expectations for auditors. Students who successfully audit a course receive an *AU* grade, which carries no credit or quality points. Students who don't meet expectations of the audit are dropped from the course with no grade or with a *W* grade. Students may not change to audit status to avoid receiving poor final grades.

Tuition charges for an audit course are 50% of the full applicable per-credit rate. Students must register to audit a course by the end of the add/drop period.

Transcripts

A transcript is a copy of a student's permanent record of attendance at the college and can't be altered. Current or former students may request that the college issue an official transcript to any school, employer, or other agency. For each transcript, students must submit a written, signed request to the Registrar or the electronic transcript exchange along with the transcript fee. Allow a minimum of five days for normal processing and two weeks following the end of a term. Transcripts aren't sent for students who haven't satisfied financial obligations to the college.

All VSC courses taken after the 2002 summer term are included and count in the determination of quality points and GPA on the Vermont Tech transcript.

Grade Amelioration

One time in an academic career, a student who's changing programs or VSC schools may have selected grades excluded from the calculation of their cumulative GPA in the new academic program. Grades may only be excluded for courses that are required in the old program and not required in the new or subsequent four-year program. All credits earned in courses excluded from the calculation are lost. This policy doesn't apply to electives or credits used for any diploma, certificate, or degree already awarded.

Approval from the student's new Department Chair or Program Director is required for grade amelioration. The student must have one term of at least 6 credits with a term GPA of 2.00 or better following the term for which amelioration is requested and approval from the Academic Deans of both the home and sending institutions.

Grade Point Average (GPA) Calculation

GPA is determined by dividing the quality points earned by the GPA credits attempted. GPA credits are those taken for a letter grade, *A* through *F*. Remedial or zero level letter-graded courses taken count as GPA credits only in the term taken. They aren't included in the cumulative GPA.

Grading System

Grade		Quality Points
A+		4.0
A		4.0
A-		3.7
B+		3.3
B		3.0
B-		2.7
C+		2.3
C		2.0
C-		1.7
D+		1.3
D		1.0
D-		0.7
F	*Failure*	0.0
P	*Pass*	0.0
NP	*No Pass*	0.0
I	*Incomplete*	0.0
AU	*Audit*	0.0
W	*Withdrawn*	0.0
CR	*Credit Received (Challenge, AP, CLEP, etc.)*	0.0
TR	*Transfer Credit Received*	0.0

Official grades are issued online at the end of each semester. Unofficial academic warnings are issued online prior to the mid-point of each term.

Incomplete Work

Work in a course which has not been completed due to satisfactory reasons may receive an *I* grade. The incomplete work must be made up as specified by the instructor no later than halfway through the subsequent term. The final grade for the course is determined by the quality of the make-up work and the previously completed work. If the student fails to complete the assigned work, the instructor determines a default grade that's entered on the student's transcript.

A student receiving an *I* grade may enroll in courses for which the incomplete course is a prerequisite. Continued enrollment in the new course is contingent on completion of the incomplete course with a passing grade.

Repeated Courses

When a course is repeated and completed, the initial grade remains on the record but doesn't count in the GPA or for credit. The most recent grade earned in a course is entered on the record and used in computing the term and cumulative GPA and class rank. If a grade other than a *W* grade is recorded in the repeated course, all attempts appear on the record and the most recent earned grade is used in computing the cumulative GPA.

Add/Drop Period

The normal add/drop period is defined as the first two weeks of classes (or the first 15% of class meetings for non-regular offerings). Degree students may add or drop a course until the end of the second week of classes with their advisors' permission. To add a class after the first week, a student must have permission from both their advisor and the instructor. Non-degree students must have the instructor's permission to add a course after the first week.

Students pay for any classes dropped after the second week of classes.

Students who have enrolled under the VSC Enrollment Consortium Agreement follow the policy of their home institution.

Withdrawals & Leaves of Absence

To withdraw or take a leave of absence once the term has started, a student must give written notification to the Registrar or off-campus site office. A parent or guardian must approve requests made by minors.

A student who stops attending classes after add/drop and doesn't inform the college is considered to have withdrawn after the 60% point of the term if the last date of an academic event can't be determined.

Grades for students on approved withdrawals or leaves of absence are in accordance with the guidelines except that *I* or *W* grades may be used after the 60% point until the end of the leave of absence.

If the request is for a medical leave of absence, a letter from the student's health practitioner is required. Students approved for a medical leave of absence must provide a time frame for their return to a normal class schedule and a subsequent letter from their health practitioner stating that they're medically fit to return to their studies.

To get approval for a leave of absence, the student must show that incomplete coursework can be satisfactorily completed upon their return.

If a student fails to return to school at the end of an approved leave of absence or if the student makes a written request to rescind the leave of absence, the withdrawal date is the original date of the request for leave or the last date of an academic event, whichever is later.

College policy is followed for students required to take a mandatory leave of absence.

Non-Returning Students

Students who don't intend to return to Vermont Tech for the subsequent term should complete a non-returning student form at the Registrar or off-campus site office and complete an exit interview with Financial Aid.

Credit by Challenge Examination

Students who can document coursework, private study, or on-the-job experiences equivalent to a Vermont Tech course may receive credit by examination.

Documentation must be submitted to the Department Chair for approval at least three weeks prior to the planned date of testing. After review and acceptance, the student submits an application for credit by examination and a challenge exam fee. Upon satisfactory completion of the exam, a maximum of 12 credits may be given toward any one program. These credits are subject to advanced standing restrictions.

Challenge exams that are taken to replace failed coursework must comply with all of the above criteria and must document new coursework, private study, or on-the-job experience since the failure occurred.

Waiver or Substitution of Courses

A student may have a specific course waived by submitting an academic petition to the Department Chair through the Dean of Academic Affairs. The petition must be approved by the student's program department and by the department offering the course.

A student may substitute another course for a specific required course if they're unable to take the course for an approved reason. The student requests a substitution by submitting an academic petition to the Department Chair through the Dean of Academic Affairs. The petition must be approved by the student's program department and by the department offering the course.

Class Level

Class level is based on total earned credits toward an academic program. It affects financial aid, class standing, and other calculations regarding student progression. Non-degree students have no class standing.

Level	Earned Credits
Freshman	0-29.99
Sophomore	30-59.99
Junior	60-89.99
Senior	90+

Credit Overload

A student credit overload is defined as a course load in excess of 19 credits in a single term.

Students with a cumulative GPA of 3.00+ may be approved for a load of up to 24 credits in a term. Students with a cumulative GPA of 2.00-2.99 may be approved for a load of up to 21 credits in a term. Students with a cumulative GPA below 2.00 aren't approved for a term credit overload. Students with overloads are reviewed at mid-term for possible load reduction.

Academic Standing

At the end of each term, academic standing is calculated for each matriculated student. There are three levels of academic standing:

Academic Good Standing
A degree student is in good standing if they meet the enrollment criteria for the term and have a cumulative GPA of 2.00 or better (1.75 for students with fewer than 30 earned credits).

Academic Probation
A degree student is on academic probation if they have a cumulative GPA below 2.00. Probation is used to identify students who may need additional services or help.

Academic Dismissal
A degree student will be academically dismissed from the college for a minimum of one term for having a term or cumulative GPA below 0.70 or for not achieving good standing while on probation (on probation for more than one semester). They receive a grade of *F* or *NP* in any incomplete course and may not enroll in any VSC course for a minimum of one term. Upon their return, they are placed on probation for a minimum of one term.

Appeal of Academic Dismissal
A student who believes there are significant mitigating circumstances may submit an email to the Academic Appeals Committee (AAC).

This email shall include the student's full name, address, and college identification number and should fully explain the circumstances surrounding the appeal. The AAC meets and makes a recommendation to the Academic Dean, who makes a final decision regarding the appeal. This decision is final and not subject to further appeal.

A student reinstated on appeal is normally reinstated on academic probation. The student must also submit a separate appeal to Financial Aid to have their aid reinstated.

Disciplinary Dismissal

Students who are dismissed from Vermont Tech for non-academic reasons are no longer matriculated students. They aren't eligible to enroll in Vermont Tech courses. These students may apply for re-admission through Admissions after they have met the conditions set for them at the time of dismissal. Re-admission requires the approval of the Dean of Students.

Returning after Dismissal

A student who has been dismissed from the college may return once they meet the requirements placed upon them at the time of dismissal. The student notifies Admissions in writing of their intent to return to Vermont Tech and must be approved for re-admission. The student is on probation and receives increased supervision and academic support for a minimum of one semester.

Upon receiving notification from Admissions, the Department Chair or Program Director determines whether a fall or spring re-admission is most appropriate and sends a registration to Admissions outlining coursework or suggested coursework prior to re-admission. Admissions forwards returning student information to the Registrar, student housing, and Financial Aid.

A Nursing student wishing to return to the Vermont Tech Nursing program after dismissal should refer to *Re-admission After Clinical Dismissal* in the Nursing student handbook

Changing Programs

If a student wishes to change programs, they must petition through the Registrar and be approved by the appropriate Department Chair.

Dual Major & Dual Degree

A student who wishes to receive an additional degree or major must complete a Change of Program request form with the Registrar. The student must complete all of the requirements of the new major or degree. There's no need to retake completed courses. An additional associate degree major must contain at least fifteen credits that weren't part of the previous major. An additional bachelor's degree major must contain at least thirty credits that weren't part of the previous major.

A student who earns multiple majors is awarded one degree with the additional majors annotated on the diploma.

Residency Requirement & Matriculation

A matriculated student is one who has been formally accepted by the college and registered in a degree program. All matriculated students have a minimum number of credit hours that must be taken at Vermont Tech. For bachelor's candidates, the residency requirement is that at least 30 credit hours, including substantial advanced work in the major, must be achieved in courses specifically taken at a VSC school. For associate and certificate candidates, at least 15 credit hours must be achieved in courses taken specifically at Vermont Tech. For master's candidates, at least 18 credit hours of coursework within the major must be completed at Vermont Tech.

Graduation Standards

All degree students are required to demonstrate competence in written and oral communication, quantitative reasoning, and information literacy at the appropriate level for their degree program. Students have more than one opportunity to meet the expected level of performance.

Graduation Requirements

In order to graduate, a student must:

- Have a 2.00 cumulative GPA
- Complete at least 30 credits of coursework at Vermont Tech for a bachelor's degree program; 15 credits minimum for an associate degree or a certificate program; or 18 credits minimum for a master's degree program
- Complete 60 credits minimum for an associate degree; 120 credits minimum for a bachelor's degree; or 30 credits minimum for a master's degree
- Satisfy all financial obligations to Vermont Tech
- Apply for graduation

Department Chairs submit program candidates who satisfy the above, as attested by the Registrar, to the full college faculty for recommendation to graduate.

Time Limitation on Graduation Requirements

Students are expected to finish their degree programs with continuous enrollment in the specified number of terms outlined in the curriculum for their programs. Students who leave the college for a full term are assigned the requirements for the catalog that's in effect for the year of their return. These students are expected to meet any new requirements for that catalog year unless the sponsoring department approves an earlier catalog year.

Each student operates under degree requirements in effect at the time of initial acceptance as a degree candidate. If, after two years for a certificate, four years for an associate, or six years for a bachelor's, the degree requirements haven't been met, the student must satisfy the graduation requirements in effect during the student's year of graduation.

A student participating in a college-sponsored part-time degree program has two years from the conclusion of the last scheduled course in the sponsored program to complete the degree requirements. After this time, if the degree requirements haven't been met, the student must satisfy the graduation requirements in effect during the student's year of graduation.

Graduation Participation Requirements

A student who successfully completes all graduation requirements and is recommended by their department graduates and receives a diploma.

A student within 7 credits of the graduation requirements who has applied to walk or graduate on their application; and has the recommendation of their department may participate as a walker. Although walkers participate in the graduation ceremony, they don't actually graduate until they have successfully completed all graduation requirements and are so recommended by their departments. A walker who subsequently completes their degree requirements must apply for a diploma that's mailed after approval and the next commencement. Walkers are expected to complete their remaining requirements within one year.

Term Honors

At the end of each term, degree students who have attained a term GPA of 3.50 or 4.00 while carrying 12 or more letter-graded credit hours and who haven't received a failing or incomplete grade in any subject during that semester are accorded Dean's List honors or President's List honors, respectively. Full-time nursing students are eligible for term honors while enrolled in a non-graded clinical course.

Reporting Academic Concerns

A student who wishes to report an academic incident should use the Academic Incident Report form and return it to the Academic Dean. This form can be used to report complaints, concerns, conflicts, and problems related to academics, courses, faculty, other students, and academic facilities.

Honesty & Ethics

Vermont Tech expects high standards of truthfulness and honesty in all academic work.
Any student who's found guilty of academic dishonesty faces disciplinary action, including dismissal from the college. Cheating refers to plagiarizing or using unauthorized aids or copying another person's work on exams, quizzes, or assignments.

Public Notice Designating Directory Information

Directory information is information which wouldn't generally be considered harmful if disclosed. It includes: name; home and college addresses; telephone listing; mailing address; date of birth; major; enrollment status (full-time or part-time); dates of attendance; awards received; weight and height of athletic team members; photographs; most recent and previous educational institutions attended; and participation in officially recognized activities and sports.

Currently enrolled students may withhold disclosure of personally identifiable directory information under the Family Educational Rights and Privacy Act (FERPA). To withhold disclosure, the student should obtain and complete a FERPA form, available at the Registrar. Vermont Tech assumes that failure on the part of any student to specifically request the withholding of directory information indicates individual approval for disclosure.

Records Review, Release, & Right-to-Know

Vermont Tech informs students of FERPA annually. This act was designated to protect the privacy of educational records; to establish the right of students to inspect and review their educational records; and to provide guidelines for the correction of inaccurate or misleading data through informal and formal hearings. Students also have the right to file complaints with the FERPA office concerning alleged failures by the institution to comply with the act.

The college has a policy of disclosing educational records to Vermont Tech and VSC officials with a legitimate educational interest without prior consent. Questions concerning FERPA may be referred to the Registrar.

Tuition & Fees 2020-2021

Estimated Costs of Attendance

Students are responsible for familiarizing themselves with the cost descriptions; payment and refund policies; and the definition of residency for tuition payment purposes as detailed below. In the following cost charts, all charges are based on full-time enrollment (12-19 credits per term) and are subject to change without notice.

Meal plans shown are for Randolph Center campus; there are no meal plans available on the Williston campus.

ALL UNDERGRADUATE (except DHY, NUR, PMD, & RAD)	**Vermont Residents**	**Non-VT Residents**	**RSP/NEBHE/GN**
Tuition	$14,712	$28,128	$22,068
Facilities Fee	904	904	904
Matriculation Fee	427	427	427
Student Activity Fee	308	308	308
Security Fee	120	120	120
Total	**$16,471**	**$29,887**	**$23,827**
Double Room & Meal Plan*	11,694	11,694	11,694
Total with Room & Meals	**$28,165**	**$41,581**	**$35,521**

DENTAL HYGIENE	**Vermont Residents**	**Non-VT Residents**	**RSP/NEBHE/GN**
Tuition	$18,432	$28,824	$27,648
Facilities Fee	904	904	904
Matriculation Fee	427	427	427
Student Activity Fee	308	308	308
Security Fee	120	120	120
Total	**$20,191**	**$30,583**	**$29,407**
Williston Double Room	7,100	7,100	7,100
Total with Room	**$27,291**	**$37,683**	**$36,507**
Attire & magnification lenses (first year)			**$1,800**
Exams & licensure (third year)			**$1,800**
Instruments & lab materials (first three years)			**$1,500**
Online support fee (fourth year)			**258**
Local anesthesia exam (second year)			**140**

PN NURSING	**Vermont Residents**	**Non-VT Residents**	**RSP/NEBHE/GN**
Tuition *(3 terms)*	$21,219	$44,814	$31,833
Facilities Fee	1,246	1,246	1,246
Matriculation Fee	427	427	427
Student Activity Fee	425	425	425
Graduation/Audit Fee	125	125	125
Security Fee	152	152	152
Total	**$23,594**	**$47,189**	**$34,208**
Double Room & Meal Plan*	13,825	13,825	13,825
Total with Room & Meals	**$37,419**	**$61,014**	**$48,033**
Lab kit			**$150**

PN NURSING	Vermont Residents	Non-VT Residents	RSP/NEBHE/GN
Laptop computer			**1,200**
Uniforms			**250**

ADN NURSING	Vermont Residents	Non-VT Residents	RSP/NEBHE/GN
Tuition	$15,432	$32,592	$23,148
Facilities Fee	904	904	904
Matriculation Fee	427	427	427
Student Activity Fee	308	308	308
Graduation/Audit Fee	125	125	125
Security Fee	120	120	120
Total	**$17,316**	**$34,476**	**$25,032**
Double Room & Meal Plan*	11,694	11,694	11,694
Total with Room & Meals	**$29,010**	**$46,170**	**$36,726**
Laptop computer			**$1,200**
Uniforms			**250**

PARAMEDICINE	Vermont Residents	Non-VT Residents	RSP/NEBHE/GN
Tuition *(3 terms)*	$23,148	$48,888	$34,722
Facilities Fee	1,356	1,356	1,356
Matriculation Fee	427	427	427
Student Activity Fee	462	462	462
Security Fee	180	180	180
Graduation/Audit Fee	125	125	125
Total	**$25,698**	**$51,438**	**$37,272**
Williston Double Room	9,467	9,467	9,467
Total with Room	**$35,165**	**$60,905**	**$46,739**

RADIOLOGIC SCIENCE	VT Residents First Year	Non-VT Residents First Year	GN First Year	VT Residents Second Year	Non-VT Residents Second Year	GN Second Year
Tuition *(3 terms for 1st year students only)*	$26,464	$52,960	$39,712	$19,848	$39,720	$29,784
Facilities Fee	1,208	1,208	1,208	904	904	904
Matriculation Fee	427	427	427	--	--	--
Student Activity Fee	412	412	412	308	308	308
Security Fee	152	152	152	120	120	120
Graduation/Audit Fee	--	--	--	125	125	125
Total	**$28,663**	**$55,159**	**$41,911**	**$21,305**	**$41,177**	**$31,241**
Williston Double Room	9,467	9,467	9,467	7,100	7,100	7,100
Total with Room	**$38,130**	**$64,626**	**$51,378**	**$28,405**	**$48,277**	**$38,341**
Uniforms (first year)						**$300**
Examination/Licensure (second year)						**200**

INTERNATIONAL	Undergrad	DHY	PN	ADN	PMD	RAD (Y1)
Tuition	$32,352	$33,048	$50,622	$36,816	$55,224	$59,808
Facilities Fee	904	904	1,246	904	1,356	1,208

INTERNATIONAL	Undergrad	DHY	PN	ADN	PMD	RAD (Y1)
Matriculation Fee	427	427	427	427	427	427
Student Activity Fee	308	308	425	308	462	412
Security Fee	120	120	152	120	180	152
Total	**$34,111**	**$34,807**	**$52,872**	**$38,575**	**$57,649**	**$62,007**
Double Room	7,100	7,100	9,230	7,100	9,467	9,467
Meal Plan*	4,594	--	4,595	4,594	--	--
Total with Room & Meals	**$45,805**	**$41,907**	**$66,697**	**$50,269**	**$67,116**	**$71,474**

GRADUATE	Vermont Residents	Non-VT Residents	RSP/NEBHE/GN	International
Tuition *(per credit)*	$745	$1,425	$1,118	$1,637
Facilities Fee *(per credit)*	38	38	38	38
Matriculation Fee	427	427	427	427
Student Activity Fee *(per credit)*	13	13	13	13
Security Fee *(per term)*	60	60	60	60

ONLINE	Vermont Residents	Non-VT Residents
Tuition *(per credit)*	$613	$613
Online Support Fee *(per term)*	258	258
Matriculation Fee	427	427
Security Fee	32	32

**Gold Plan for Randolph Center campus; no meal plans at Williston campus*

Program-Specific Fees

Automotive Technology

The student must have a set of tools for use in the lab and the summer internship which requires a one-time first-year expense of around $5,000.

Professional Pilot	Flight Fees	Flight Hours	Credits
AER 1021	$12,932	30	1
AER 1120	12,307	52	2
AER 2031	17,855	78	2
AER 2032	8,782	35	2
AER 3020	4,473	15	2
AER 4010	4,729	10	1
AER 4020	3,089	15	1
AER 4030	6,685	15	1

These fees are based on the average number of hours to complete a course. Additional hours may be required and are billed on an hourly basis until successful completion. All required courses must use full flight hours.

Some flight courses begin as 141 with an enrollment certificate. If a student receives sufficient training to complete the FAA check-ride with fewer hours, they can drop as 141 students and receive an FAA Part 61 check-ride to complete. Excess funding must be returned to the VA or the student's account after financial scrutiny of fewer flight hours.

FAA First Class Medical Examination & Drug Screening: $200

Completed by an authorized aviation medical examiner and a copy submitted to the Program Director or Admissions by June 1.

FAA Written Exam Fees: $165 per exam
Six exams required during the program.

FAA Examiner Fees: $300-700 per check ride
Paid directly to the examiner before each oral and flight test for each certificate and rating.

Pilot Equipment: $1,700-2,000

Insurance: $314 per year
VFA carries liability and hull insurance and extends limited liability coverage to students, but students are responsible for the insurance deductible in the event of a loss. Each student must purchase an individual non-owner policy to cover student liability protection for legal defense; deductible and loss of use; and subrogation.

Respiratory Therapy	
Laptop computer	1,200
Clinical Report System License	150
Stethoscope	100
Lab kit	86
Scrubs	80
BLS/ACLS certification fee	75
Protective goggles	20

Per Credit Tuition & Fees

Degree-seeking undergraduate students registered for 12-19 credit hours are considered full-time. Overload fees apply to class loads of 20+ credit hours and are billed at the rates below. Degree-seeking students registered for fewer than 12 credit hours are considered part-time and are charged on a per credit basis at the rates below. Non-degree students are charged for all credits. RSP/NEBHE,GN cost is shown as money due after credit is applied.

TUITION	Vermont Residents	Non-VT Residents	RSP/NEBHE/GN	International
Undergraduate	$613	$1172	$920	$1,348
Dental Hygiene	768	1,201	1,152	1,377
Nursing & Paramedicine	643	1,358	965	1,534
Radiologic Science	827	1,655	1,241	1,869
Graduate	745	1,425	1,118	1,637

FEES	
Student Activity Fee* *(all matriculated students, per credit, maximum 11 credits)*	$13
Non-degree Student Registration Fee *(per term)*	78
Facilities Fee* *(all matriculated students, per credit, maximum 11 credits)*	38

2021 SUMMER TUITION	Vermont Residents	Non-VT Residents	RSP/NEBHE/GN	International
Undergraduate	$613	$920	$920	$1,348
Dental Hygiene	768	1,152	1,152	1,377
Nursing	643	965	965	1,534
Graduate	745	1,118	1,118	1,118

No financial aid for summer term; payment in full is expected by the start of summer classes.

ROOM & BOARD RATES *(per term)*	Randolph Center	Williston
Single Room	$4,480	$4,480
Double Room	3,550	3,550
Triple Room	2,800	2,800

ROOM & BOARD RATES *(per term)*	Randolph Center	Williston
Overnight rooms for emergencies *(per night)*	50	50
Gold Meal Plan *(unlimited with 246 debit points and 6 guest meals per term)*	2,297	--
Base Meal Plan *(12 meals per week with 396 debit points and 6 guest meals per term)*	2,213	--
8 Meal Plan *(8 meals per week with 273 points at snack bar and 6 guest meals per term)*	2,126	--

Senior Citizen Discount

Any student aged 65 or older may audit one VSCS course per enrollment period without tuition charge. Additional courses may be taken without limitation, up to and including completion of a certificate or undergraduate degree, at the rate of 50% of the charged tuition. These students may not take the place of tuition-paying students in courses with enrollment limits. All applicable fees are the responsibility of the student.

Fee Descriptions

Application Fee: $55

Challenge Exam Fee: $159 per exam
Required when students take challenge exams for college credit or advanced standing.

Course Fee
Offsets the cost of special projects or equipment for specific courses.

Deferred Payment Fee: $60 per term
Charged when term charges are deferred because an outside source is providing direct payment past the normal due date.

Facilities Fee: up to $452 per term
Charged to all matriculated students and prorated per credit hour for part-time students; supports development of new facilities on the residential campuses.

Graduation Fee: $125 per degree
Charged for each degree a student receives regardless of whether they participate in a graduation ceremony. Typically charged when they submit a graduation application, but can be charged after the ceremony. A student who doesn't meet graduation participation requirements will be removed from the list and the graduation fee removed.

Health Insurance Fee: $1,675 per year
Mandatory for all full-time students not otherwise covered. For exemption, present written proof of coverage and complete the Student Waiver for the VSCS Student Health Insurance Plan in Web Services. Students failing to submit the online form by the published deadline are automatically enrolled in and billed for the VSCS health plan.

Institutional Lab Fee: $82 per lab credit hour
Required to offset the cost of instruction in labs, studios, clinicals, activities, and practica.

Late Financial Clearance Fee: $143
Charged to students who haven't paid or provided proof of future payment. Financial holds and this fee activate approximately 30 days into each term.

Matriculation Fee: $427
A one-time charge to all matriculated students in the first enrolled term.

Nursing Re-entry Fee: $2,000
A one-time charge for previously credentialed nurses who hold inactive or lapsed licensure in Vermont and do not meet the number of required practice hours for licensure as defined by the Vermont State Board of Nursing.

Online Support Fee: $258
To provide support infrastructure for students in online programs.

Portfolio Assessment Fee: $50 per portfolio

Registration Fee: $78 per term
For non-degree students.

Returned Payment Fee: $25
For any payment that's returned to Student Accounts by the banking institution for insufficient funds, invalid accounts, etc. For returned checks that were received for cash, we won't accept any subsequent checks.

Safety & Security Fee: $60 per term
Charged to all matriculated students to ensure a safe and healthy learning environment.

Student Activity Fee: up to $154 per term
Covers the expense of student clubs, activities, and admission to most campus events such as concerts, dramatic productions, films, lectures, and recreational and social activities.

Transcript Fee: $6.50 per copy

Textbooks, Supplies, & Other Expenses

The cost of textbooks and supplies varies by program, but is typically around $800 per term. Upon approval, students who have financial aid to cover expenses plus books can charge books to their student accounts 30 days prior to the start of each term.

College students incur a variety of other expenses (travel, social activities, laundry, etc.) The college estimates these cost about $1,650 per year.

Payment Authorization

Students can authorize anyone they choose to access, log in, view, and/or make a payment on their account via the web.

Payment Plans

Fall plans are available online through Self Service beginning June 1 or when billed. You must have a login ID, a password, and a billing statement to access this service.

We offer five convenient in-house plans for fall (see Student Accounts for other semester plans):

- Six payments from June through November
- Five payments from July through November
- Four payments from August through November
- Three payments from September through November
- Two payments from October through November

There's a $30 enrollment fee and a down-payment required when signing up based on the option chosen. Monthly payments are due on the fifteenth of each month and a $15 late fee is incurred for payments not made by the due date. Term balances must be paid in full prior to enrolling in future terms. A new payment plan must be set up each term.

As a condition of enrollment, students must provide payment in full or proof of how all term charges will be paid within 30 days of billing. Fall billing begins on or around June 1.

Employer payments requiring final grades can be deferred. Please contact Student Accounts for more information and eligibility requirements.

Financial delinquency may serve as a basis for dismissal. Financially delinquent students are denied enrollment for subsequent terms; issuance of grades or transcripts; or graduation. Reasonable interest and collection costs may be added to delinquent accounts.

Refund Policy

Upon complete withdrawal or dismissal from the institution prior to the 60% point of the term, a student shall be credited tuition, room, and board charges on a prorated basis. Upon complete withdrawal or dismissal on or after the 60% of the semester, no adjustment or credit shall be issued to the student's account.

Date of Withdrawal

The date of withdrawal or dismissal is determined by the Registrar's office. Ceasing attendance of classes does not constitute dropping those classes or withdrawal from the institution. In order to be eligible for a refund or repayment pursuant to the above policy, the student ***must*** notify the institution in writing according to the processes outlined on our website. For questions regarding this process, contact the Registrar's office.

Prorated Tuition, Room, & Board Calculation Due to Withdrawal or Dismissal from the Institution and Residence Halls

The prorated calculation for tuition, room, and board uses the number of calendar days completed from the first day of the semester to the time of withdrawal or dismissal, divided by the number of total calendar days included for the full term. For all students, including online students, the first day of the semester is the date that classes begin, as published in this catalog, regardless of the date of the student's first class. Even if the number of planned residential days is fewer than the number of academic calendar days, the academic calendar is the basis of all pro rata credit calculations.

Prorated Room & Board Calculation Due to Withdrawal from Residence Halls While Remaining Enrolled

In the event a student exits the residence hall, for any reason, while continuing to remain enrolled academically, the institution is under no obligation to issue credits or refunds. This includes closure due to a calamity or catastrophe beyond the institution's control that would make continued operation of student housing infeasible, including, but not limited to, such circumstances as natural disaster, national security threat, or widespread pandemic.

Return of Funds

If a student receives financial aid, credit received as a result of withdrawal or dismissal is first applied to financial aid sources. Federal regulations are used for return of Title IV funds and individual state, institution, or outside scholarship policies for return of non-Title IV funds. Because financial aid funds must be used for educational expenses, when a student is receiving financial aid for non-institutional costs and withdraws from the institution, a portion of this aid must be repaid. The order of distribution for the return of Title IV funds is as follows:

1. Unsubsidized FFEL/Direct Stafford Loan
2. Subsidized FFEL/Direct Stafford Loan
3. Perkins Loan
4. FFEL/Direct PLUS Loan
5. Pell Grant
6. FSEOG
7. Other Title IV programs

Financial Aid

All federal funds at Vermont Tech are awarded on the basis of financial need. All students who apply for institutional financial aid by the March 1 priority deadline and who are eligible for assistance are offered financial aid, subject to availability of funds. The amount of any award is determined by the amount of student need as computed from information provided by the family on the Free Application for Federal Student Aid (FAFSA). Students may apply for financial aid by filling out a FAFSA online. It's important to file the FAFSA as early as possible to avoid delays in processing loan applications and other forms of campus-based aid. After March 1, late applicants are considered for institutional aid only after we process all on-time applications.

Vermont residents should also complete the Vermont Grant Application through VSAC. Non-residents should check with their home state higher education agency for grant information.

Students selected for verification must submit additional information. Financial Aid uses imaging to maintain and track documentation sent to the office and all originals are shredded.

All FAFSA applicants and parents of dependents who indicate that they *have filed* or *will file* a federal tax return should use the IRS Data Retrieval Tool to report or update their income information on the FAFSA.

Sources of Financial Aid

When you file a FAFSA, you're applying for federal, state, and institutional aid programs and establishing eligibility for a Federal Direct Loan.

Federal

The Federal Pell Grant Program is an entitlement program. This means that all eligible students receive awards. Eligibility is determined by the FAFSA.

Federal Direct Loans *(*subsidized and unsubsidized) are available to qualified students. A subsidized loan is awarded on the basis of financial need and the federal government pays interest on the loan until the student begins repayment and during authorized periods of deferment. The student pays the interest on an unsubsidized loan.

If you're a dependent undergraduate student, you can borrow up to:

- ***$5,500*** if you're a first-year student enrolled in a program of study that's at least a full academic year.
- ***$6,500*** if you've completed your first year of study and the remainder of your program is at least a full academic year
- ***$7,500*** per year if you've completed two years of study, are matriculated in a bachelor's degree program, and the remainder of your program is at least a full academic year

Additional unsubsidized Direct loan limits may be increased by $4,000 for dependent students whose parents are denied a Direct Federal Plus loan.

Independent undergraduate students may borrow to $12,500 per year, depending on their year of study. However, students in the unsubsidized loan program can't borrow more than the cost of attendance minus any other financial aid for which they're eligible.

Both subsidized and unsubsidized loan eligibility amounts are outlined on a student's award letter.

All Federal Direct and PLUS loans are processed through the Federal Direct Loans Program (Direct Loans). Direct Loans provides Parent PLUS loans to parents of dependent undergraduate students through the school, funded directly by the government.

PLUS Loans enable parents with good credit histories to borrow for each dependent student who is enrolled at least half-time. Parents who wish to apply must fill out a PLUS Loan Request Form, which is available through Financial Aid. A request form is automatically mailed with financial aid award notification letters. The yearly limit on a PLUS Loan is the cost of attendance minus any other financial aid for which a student is eligible.

150% Rule for Subsidized Loans
On July 6, 2012, the Moving Ahead for Progress in the 21st Century Act (MAP-21) (Public Law

112-141) was enacted and limits a first-time borrower's eligibility for Direct Subsidized Loans to a period not to exceed 150% of the length of the borrower's education program. In the summer of 2013, final regulations were completed. This legislation was enacted to encourage students to obtain their degrees within a reasonable time frame.

First-time borrowers on or after July 1, 2013 are subject to the provisions in this legislation. Generally speaking, a first-time borrower is one who didn't have an outstanding balance of principal or interest on a Direct Loan or FFEL loan on July 1, 2013.

Federal regulations limit the time period during which you can receive Direct Subsidized loans to 150% of the standard length of the program in which you're enrolled. For example, for a bachelor's degree program that is normally completed in four years attending full-time, borrowers can receive subsidized loans for a maximum of six years (*150% x 4 = 6*). The period is reduced for less than full-time study. Once you've received direct subsidized loans for your maximum eligibility period, you may continue to receive direct unsubsidized loans and your subsidized loans may begin to accrue interest.

Federal Aid Programs Administered by the College
The Federal Supplemental Education Opportunity Grant (FSEOG) is a gift of money to assist students with the cost of their education. It's restricted to undergraduates and doesn't require repayment. The maximum amount awarded is $4,000, depending on a student's need and the availability of funds at Vermont Tech. Average grants range from $600 to $1,600 per year. Students who are eligible for Pell grants have first consideration for this fund.

The Federal Work-Study Program (FWS) is a federal work program administered by Vermont Tech which provides jobs for students on or off campus. Average awards range from $1,200 to $1,600 for the year, which translates to approximately 10-14 hours of work per week. Students may also use FWS funds for off-campus non-profit community service placements. Federal Work-Study earnings aren't credited on a student's bill. Instead, the student worker receives a paycheck every two weeks.

State
Vermont Incentive Grants are awarded on the basis of financial need. Any full-time undergraduate Vermont resident who plans to attend or is enrolled in an approved post-secondary institution and who has not already received a bachelor's degree is eligible to apply.

Students are required to file supplemental information with VSAC to be considered for a Vermont state grant.

Other states, including Maine, Rhode Island, Connecticut, and Massachusetts, offer undergraduate grants or scholarships usable at Vermont Tech. All students eligible for these grants should apply for them. Contact Financial Aid or your high school guidance office to find out which states require supplemental information.

Veterans Education Benefits
Veterans planning to attend Vermont Tech using the *GI Bill*® should indicate this on their admissions application.

Please visit the GI Bill® website and complete the VA form that applies:

- 22-1990 if you have served in the military and are applying for education benefits for the first time
- 22-1990E if you are a dependent using a spouse's or parent's post-9/11 GI Bill® benefits
- 22-1995 if you are a veteran who is changing schools
- 22-5490 if you are a dependent (child or spouse) of a deceased or 100% disabled veteran and are applying for benefits for the first time
- 22-5495 if you are a dependent who is changing schools

After the VA processes an application, they send a certificate of eligibility letter to the applicant, which the applicant should forward to:

Vermont Technical College
Attn.: Veterans' Certifying Official
PO Box 500
Randolph Center, VT 05061

Once eligibility is established, student enrollment is certified with the VA. Veterans must submit a request for certification prior to the start of classes every term. If a student doesn't want to be certified or is no longer eligible for VA benefits, they must notify the school certifying official.

Veterans need to be prepared to purchase books and have living expenses for the first four to six weeks of classes. The initial payments can be slow, but are retroactive to the start of the term once they begin.

Veterans must submit a request for enrollment certification each time they register for classes.

The VA determines the BAH rate. The VA calculates MHA based on the location of the campus where the student physically attends a majority of their classes.

Veterans who are certified as eligible for the GI Educational Assistance allowance are permitted to register upon signing an approved payment plan with Student Accounts. A late financial clearance fee and financial hold will only be placed on students who have not paid any portion not covered by the VA or provided their Certificate of Eligibility to the VA Certifying Official at Vermont Tech. Financial holds and late fees are activated approximately 30 days into each term.

Any covered individual is permitted to attend or participate in the course of education during the period beginning on the date on which the individual provides to the educational institution a certificate of eligibility for entitlement to educational assistance under chapter 31 or 33 (a certificate of eligibility can also include a *Statement of Benefits* obtained from the Department of Veteran Affairs [VA] website: eBenefits or VA 28-1905 form for chapter 31 authorization purposes) and ending on the earlier of the following dates:

1. The date of which payment from the VA is made to the institution
2. 90 days after the date the institution certified tuition and fees following the receipt of the certificate of eligibility

Vermont Tech will not impose any penalty, including the assessment of late fees, the denial of access to classes, libraries, or other institutional facilities or require a covered individual to borrow additional funds because of the individual's inability to meet their financial obligations to the institution due to the delayed disbursement of funding from the VA under chapter 31 or 33.

The *Vermont National Guard State Educational Assistance Program* provides tuition assistance to eligible members of the Vermont National Guard who are enrolled in undergraduate degree and diploma programs at public colleges in Vermont. Contact with your Education Service Officer is required to process an application.

Other Financial Aid Sources

Scholarships are available to students who meet the criteria set for each. Contact Financial Aid for information about scholarships appropriate to your situation.

Vermont Tech also has institutional grants which are awarded based on financial need or merit. Financial need is determined using the same criteria used for awarding campus-based aid. The maximum amount awarded depends upon the availability of funds and student need.

Satisfactory Academic Progress (SAP)

Federal statutes and regulations require that recipients of federal financial aid must progress at a pace to ensure degree completion within the maximum time frame allowed and must be in good standing based on cumulative GPA requirements.

Students are reviewed on a term basis. Students not making SAP (either the pace or the GPA requirement) as described below lose their financial aid eligibility for all aid types. Students have to successfully appeal to the Director of Financial Aid in order to continue to receive Title IV aid despite failing SAP standards. Students who are academically dismissed from their programs are automatically recognized as failing to meet SAP standards.

All terms in which a student is enrolled, including periods in which the student didn't receive federal student aid funds, must be considered in the determination of SAP.

1. **Pace/Time Progression** Students must successfully complete 67% of their attempted courses within the VSCS as recorded and documented by the Registrar. Dropped courses aren't included. Courses from which the student withdraws after the end of the

add/drop period are counted toward attempted courses. For financial aid eligibility, total hours attempted, including transfer credits counted toward the degree, can't exceed 150% of graduation requirements. As an example, if you attempt/enroll in 12 credits for one semester, you must successfully complete 8 of those 12 credits (*12 x 67% = 8*).

2. **GPA Requirement** Students with fewer than 30 attempted credits must maintain a cumulative GPA of 1.75. Students with 30 attempted credits or greater must maintain a cumulative GPA of 2.00 as documented by the Registrar.
3. **Maximum Time Frame** The maximum time frame for a student to complete their academic program may not exceed 150% of the published length of the program, measured in credit hours. As an example, if an associate degree program requires 68 credits, the maximum time frame allowed to complete the program would be 102 credits* (*68 x 150% = 102*).

**Different programs have different degree requirements. Students who have reached the maximum time frame aren't eligible for federal financial aid.*

Appeal Process
An appeal is the process by which a student who isn't meeting Vermont Tech's SAP standards can petition the school for reconsideration of Title IV eligibility.

An appeal form is sent to each student not making SAP. The form explains how the student has failed to meet SAP and the steps to appeal the loss of financial aid. To appeal, students complete the form and submit it, along with all supporting documentation, to the Director of Financial Aid. As part of the appeal, the student must include information regarding why they failed to make SAP and what has changed in their situation that would allow the student to demonstrate SAP at the next evaluation. An appeal must be based on significant mitigating circumstances that seriously impacted academic performance. Examples of mitigating circumstances are: serious illness, severe injury, death of a family member, and other similar situations.

Approval is based on the likelihood that the student will meet SAP at the next review. Please note that merely filing an appeal doesn't guarantee continued eligibility for federal aid. Students should make every effort to improve their SAP standing, as they're limited to two SAP appeals.

If a student's appeal is approved, the student is considered for federal aid during the probationary periods for which the student has applied and is otherwise eligible. Once the probationary period has concluded, the student may re-establish eligibility for federal aid for a subsequent term by meeting SAP standards.

Financial Aid Probation: a status assigned to a student who fails to meet SAP who has appealed and has had eligibility for aid reinstated

Financial Aid Warning: a status assigned to a student who fails to make SAP. The student may continue to receive Title IV aid for one payment period. Students receive a warning that they need to bring their academic standing up to satisfy academic progress standards in their following term as outlined or they lose their eligibility for aid. No appeal is necessary for this status.

Appeal Denial: if an appeal for federal financial aid is denied, the decision is final for that term. The student may re-establish eligibility for federal aid for a subsequent term by taking action to comply with the GPA and pace/time progression components of SAP policy standards.

Special Circumstances
Students with documented disabilities may be allotted additional time for completion of courses.

Change in Degree Program

All credits earned at Vermont Tech plus transfer credits are normally counted when the student changes degree programs. Each case is evaluated on its own merit. Students may not extend their period of enrollment by changing their majors after accumulating maximum credits for a program.

Grades & Credits

Courses with grades of *W* (withdrawn), *I* (incomplete), or *F* (failed) are counted as courses attempted but not earned and are also counted toward the maximum time frame.

Credits earned for repeated courses and remedial coursework don't count toward academic progress. Courses graded solely on a pass/fail basis that are accepted toward the academic program are included when measuring academic progress.

Transfer credits accepted toward the student's academic program or degree count as both attempted and earned credits and are counted when measuring SAP, but don't impact GPA.

Review of Awards

The Director of Financial Aid reserves the privilege of reviewing and revising awards. Therefore, the applicant should notify Financial Aid immediately if there's a change in either the student's or the family's financial situation. This includes the receipt of non-college scholarships. Financial aid awards may be adjusted upon receipt of such items as family contributions, grants, outside scholarships, and loans. Eligibility for financial aid depends on such resources not exceeding the total costs of attending VTC.

If a student receives an outside scholarship that the college doesn't know about at the time an award letter is prepared, they're issued a revised award reflecting an adjustment to avoid an over-award situation. Any initial adjustment is reflected in unmet need, then self-help (loan and work) before the gift aid portion of the financial aid package is adjusted.

Most financial aid awards are based originally upon the assumption that a student will enroll as a full-time student (12 or more credits per term) unless they have notified us to the contrary. If a student changes status from full- to part-time enrollment, an aid adjustment may result. A review of enrollment status is completed each term at the end of the add/drop period; any aid adjustments are made accordingly.

Notice of Federal Student Financial Aid Penalties for Drug Law Violations

Per Federal Financial Aid Regulations 34 CFR 668.40, HEAO Sec. 488(g), amended HEA Sec. 485 (20 U.S.C. 1092), HEA Sec. 485(k)

In compliance with the above regulation, this statement serves as notice that a student who has a drug conviction for any offense during a period of enrollment for which the student was receiving Title IV HEA program funds (Federal Pell, Supplemental Education Opportunity Grant, Federal Work-Study, Federal Perkins Loan, Federal Stafford Loans, Federal PLUS Loans, Federal Grad PLUS Loans) under any federal or state law involving the possession or sale of illegal drugs will result in the loss of eligibility for any Title IV program funds.

School of Agriculture, Plant, & Animal Sciences

Agribusiness Management (AAS)

A student with an Associate of Applied Science in Agribusiness Management will be able to:

1. Apply knowledge of concentrated agribusiness industries to effectively and professionally communicate technical information in writing, speaking, listening, and interpersonal skills to work as part of a team and interact with clients, the public, and industry professionals
2. Apply knowledge of general agribusiness science and technology to concentrated agribusiness industry problems that require the application of principles and applied procedures or methodologies
3. Understand the income and expenses of concentrated agribusiness industries
4. Prepare and assess agricultural business plans
5. Competently represent the vocation of agriculture
6. Combine knowledge of concentrated agriculture industries with practical aspects of organizing and managing a small business, marketing, applying accepted practices, managing agricultural business operation budgets, and writing a business plan for concentrated agricultural operations

The minimum number of credits required for the degree is 63.

First Year

Fall Term			Spring Term		
CORE CURRICULUM			**CORE CURRICULUM**		
ACC 1020	Survey of Accounting	3	ACC 1010	Computerized Accounting	3
AGR 1011	Agricultural Techniques I	1	ENG 2080	Technical Communication	3
CIS 1050	Introduction to Spreadsheets	1	INT 1005	Self, Career, & Culture	3
ENG 1061	English Composition	3	LAH 1050	Introduction to Soils	4
MAT 1210	Principles of Mathematics	3			
ANIMAL SCIENCE CONCENTRATION			**ANIMAL SCIENCE CONCENTRATION**		
AGR 1050	Livestock Production	3	AGR 1030	Animal Reproduction & Genetics	3
FOREST SCIENCE CONCENTRATION			**FOREST SCIENCE/PLANT SCIENCE CONCENTRATION**		
AGR 2130	Dendrology	4	BIO 1220	Botany	4
PLANT SCIENCE CONCENTRATION					
LAH 1020	Introduction to Horticulture	3			
AMT 2+2 TRACK			**AMT 2+2 TRACK**		
BIO 1020	Introduction to Environmental Biology	4	CHE 1031	General Chemistry I	4
		14-15			**16-17**

Second Year

Fall Term

CORE CURRICULUM

BUS 2210	Small Business Management	3
BUS 3230	Principles of Financial Management	3
CHE 1020	Introduction to Chemistry	4

ANIMAL SCIENCE CONCENTRATION

AGR 2011	Dairy Herd Management I	4
AGR 2012	Dairy Herd Management II	2
AGR 2040	Forage Production	3

FOREST SCIENCE CONCENTRATION

AGR 1061	Burls to Boards	3
BIO 1241	Introduction to Forest Ecology	4

PLANT SCIENCE CONCENTRATION

select two

AGR 2130	Dendrology	4
BIO 2040	Entomology & Pest Management	3
LAH 2020	Plant Propagation	3
LAH 2030	Herbaceous Plant Materials	3

16-19

Spring Term

CORE CURRICULUM

BUS 2230	Principles of Marketing	3
BUS 3721	Business Planning Seminar	3
ELE XXXX	AH/SS elective	3

ANIMAL SCIENCE CONCENTRATION

AGR 2030	Animal Nutrition	4
AGR 2050	Large Animal Diseases	3

FOREST SCIENCE CONCENTRATION

AGR 1062	Timber Harvesting	4
AGR 1801	Forest Management	3

PLANT SCIENCE CONCENTRATION

BIO 2030	Plant Pathology	3
LAH 1040	Greenhouse Management	3

AMT 2+2 TRACK

CHE 2060	Principles of Organic Chemistry	4

13-17

Dairy Farm Management (AAS)

A student with an Associate of Applied Science in Dairy Farm Management will be able to:

1. Apply knowledge of the dairy industry to effectively and professionally communicate technical information in writing, speaking, listening, and interpersonal skills to work as part of a team and interact with clients, the public, and industry professionals
2. Apply knowledge of dairy science and technology to dairy industry problems that require extensive practical knowledge
3. Understand dairy cow nutrition and ration evaluation
4. Understand dairy reproduction and breeding systems
5. Understand heifer-raising
6. Manage dairy cow transition from dry to lactating
7. Understand forage production and management
8. Understand dairy operation budgeting
9. Combine knowledge of the dairy industry with practical aspects of organizing and managing a small business, marketing, applying accepted accounting practices, managing a dairy operation budget, and writing a business plan for a dairy operation

The minimum number of credits required for the degree is 63.

First Year

Fall Term

CORE CURRICULUM		
ACC 1020	Survey of Accounting	3
AGR 1011	Agricultural Techniques I	1
AGR 1050	Livestock Production	3
CIS 1050	Introduction to Spreadsheets	1
ENG 1061	English Composition	3
MAT 1210	Principles of Mathematics	3
DFM 2+2 TRACK		
BIO 1020	Introduction to Environmental Biology	4
		14-18

Spring Term

CORE CURRICULUM		
AGR 1012	Agricultural Techniques II	1
AGR 1030	Animal Reproduction & Genetics	3
AGR 2030	Animal Nutrition	4
INT 1005	Self, Career, & Culture	3
LAH 1050	Introduction to Soils	4
DFM 2+2 TRACK		
CHE 1031	General Chemistry I	4
		15-19

Second Year

Fall Term

CORE CURRICULUM		
AGR 2011	Dairy Herd Management I	4
AGR 2012	Dairy Herd Management II	2
AGR 2040	Forage Production	3
BUS 3230	Principles of Financial Management	3
ENG 2080	Technical Communication	3
SSC 2720	The Social Ecology of Food	3
		18

Spring Term

CORE CURRICULUM		
AGR 2050	Large Animal Diseases	3
AGR 3050	Applied Nutrient Management Planning	3
BUS 2210	Small Business Management	3
ELE XXXX	AH/SS elective	3
DFM 2+2 TRACK		
CHE 2060	Principles of Organic Chemistry	4
		12-16

Diversified Agriculture (BS)

A student with a Bachelor of Science in Diversified Agriculture will be able to:

1. Effectively and professionally communicate technical information in writing, speaking, listening, and interpersonal skills to work as part of a team and interact with clients, the public, and industry professionals
2. Apply knowledge of agricultural science and technology to industry problems that require the application of applied procedures or methodologies
3. Analyze livestock nutrition and ration evaluation
4. Design, plan, and implement healthy plant environments
5. Create and analyze a nutrient management plan
6. Analyze the operational details of various New England agricultural industries
7. Combine knowledge of agricultural industries with organizing and managing a small business, marketing, accepted accounting practices and operation budgeting, assessing operations, and writing a business plan for an agricultural operation

The minimum number of credits required for the degree is 122.

First Year

Fall Term			Spring Term		
ACC 1020	Survey of Accounting	3	AGR 1012	Agricultural Techniques II	1
AGR 1011	Agricultural Techniques I	1	AGR 2030	Animal Nutrition	4
AGR 1050	Livestock Production	3	ENG 2080	Technical Communication	3
CIS 1050	Introduction to Spreadsheets	1	INT 1005	Self, Career, & Culture	3
ENG 1061	English Composition	3	LAH 1050	Introduction to Soils	4
MAT 1210	Principles of Mathematics	3	**as required**		
as required			XXX XXXX	Elective	3
XXX XXXX	Elective	3			
		14-17			**15-18**

Second Year

Fall Term			Spring Term		
BUS 3230	Principles Financial Management	3	BUS 2210	Small Business Management	3
CHE 1031	General Chemistry I	4	BUS 2230	Principles of Marketing	3
SSC 2720	The Social Ecology of Food	3	ELE XXXX	AH/SS elective	3
as required			**select one**		
XXX XXXX	Elective	3	CHE 2060	Principles of Organic Chemistry	4
			MAT 2021	Statistics	3
			as required		
			XXX XXXX	Elective	3
		13-18			**15-16**

Third Year

Fall Term

LAH 1020	Introduction to Horticulture	3
as required		
XXX XXXX	Elective	3
		12-19

Spring Term

AGR 3050	Applied Nutrient Management Planning	3
AGR 3111	Vegetable Production	3
BIO 1220	Botany	4
XXX XXXX	Elective	3
select one		
CHE 2060	Principles of Organic Chemistry	4
MAT 2021	Statistics	3
		16-17

Fourth Year

Fall Term

AGR 4040	Agricultural Products	3
AGR 4802	AGR Senior Summer Internship Review	1
ELE XXXX	AH/SS elective	3
as required		
XXX XXXX	Elective	3
		12-19

Spring Term

BUS 2410	Human Resource Management	3
BUS 3721	Business Planning Seminar	3
ELE XXXX	AH/SS elective	3
select one		
CHE 2060	Principles of Organic Chemistry	4
MAT 2021	Statistics	3
as required		
XXX XXXX	Elective	3
		13-19

Forestry (AAS)

A student with an Associate of Applied Science in Forestry will be able to:

1. Apply knowledge of the forestry and logging industries to effectively and professionally communicate technical information in writing, speaking, listening, and interpersonal skills to work as part of a team and interact with clients, the public, and industry professionals
2. Apply knowledge of timber science and technology to forestry and logging industry problems that require extensive practical knowledge
3. Demonstrate familiarity with tree identification; functions of a forest ecosystem; natural community and site indicator species identification; forestry inventory data collection; mapping skills; operation of a chainsaw and sawmill; maple management and production; and timber harvesting techniques
4. Create a forest management plan
5. Combine knowledge of the forestry and logging industries with practical aspects of organizing and managing a small business; marketing, applying accepted accounting practices; managing a forestry or logging operation budget; and writing business plans for forestry or logging operations

The minimum number of credits required for the degree is 64.

First Year

Fall Term

ACC 1020	Survey of Accounting	3
AGR 2130	Dendrology	4
CIS 1050	Introduction to Spreadsheets	1
ENG 1061	English Composition	3
select one		
MAT 1210	Principles of Mathematics	3
MAT 1311	Precalculus I	3
as required		
LAH 1020	Introduction to Horticulture	3
		14-17

Spring Term

AGR 1062	Timber Harvesting	4
BIO 1220	Botany	4
INT 1005	Self, Career, & Culture	3
LAH 1050	Introduction to Soils	4
select one		
DSL 1050	Preventative Maintenance	3
MEC 1180	Introduction to Welding	3
		18

Second Year

Fall Term

AGR 1061	Burls to Boards	3
AGR 2210	Applied ArcGIS	2
BIO 1241	Introduction to Forest Ecology	4
BUS 2210	Small Business Management	3
BUS 3230	Principles of Financial Management	3
as required		
LAH 2020	Plant Pathology	3
		15-18

Spring Term

AGR 1801	Forest Management	4
AGR 3040	Maple Production	3
ELE XXXX	AH/SS elective	3
ENG 2080	Technical Communication	3
select one		
BIO 2030	Plant Pathology	3
DSL XXXX	Diesel elective	3
MEC 1190	Advanced Welding	2
		15-16

Landscape Contracting (AAS)

A student with an Associate of Applied Science in Landscape Contracting will be able to:

1. **Graphic Communication Skills:** Demonstrate an appropriate mastery of freehand sketching, board drafting, and presentation graphics for the formulation, exploration, and communication of design ideas
2. **Communication Skills:**
   a. Demonstrate a high level of ability to communicate technical and theoretical information through both the written and spoken word
   b. Demonstrate a high-level ability to verbally communicate design ideas effectively to clients and jury
3. **Technical Skills:**
   a. Demonstrate an appropriate mastery of the materials and methods of construction
   b. Create plans for the installation, operation, and maintenance of greenhouse and nursery environmental systems
4. **Design Skills:**
   a. Demonstrate an appropriate mastery of fundamental design principles, theory, and practice
   b. Perform cost estimates related to design and construction
5. **Horticultural Skills:**
   a. Demonstrate an appropriate mastery of the identification of woody ornamental plants
   b. Demonstrate an appropriate mastery of the identification of herbaceous ornamental plants
   c. Explain the concepts and techniques of integrated pest management and use that knowledge to make management recommendations
   d. Demonstrate an appropriate mastery of the propagation and production of herbaceous and woody ornamental plants
   e. Demonstrate a comprehensive understanding of soils and their properties as they apply to the landscape industry
   f. Demonstrate an appropriate mastery of landscape applications such as plant selection, cultural requirements, cultural practices, and maintenance
6. **Business Skills:**
   a. Demonstrate the ability to examine and analyze the practical aspects of organizing and managing a small business
   b. Create contract proposals (short form and long form) that protect the interests of the contract and client
   c. Write solid specifications that lay out the responsibilities of all participating parties
   d. Demonstrate the principles of professional conduct in all aspects of client/customer and employee/employer relations

The minimum number of credits required for the degree is 62.

First Year

Fall Term

CIS 1050	Introduction to Spreadsheets	1
ENG 1061	English Composition	3
LAH 1020	Introduction to Horticulture	3
LAH 1021	Landscape Graphics	2
LAH 1030	Woody Ornamentals †	3
MAT 1210	Principles of Mathematics	3
		15

Spring Term

BIO 1220	Botany	4
ELE XXXX	AH/SS elective	3
LAH 1031	CAD for Landscape Applications	2
LAH 1050	Introduction to Soils	4
LAH 2011	Introduction to Landscape Design	2
		15

Second Year

Fall Term

BIO 2040	Entomology & Pest Management	3
CPM 2010	Construction Estimates I	3
LAH 2010	Landscape Construction Practices	3
LAH 2020	Plant Propagation	3
LAH 2030	Herbaceous Plant Materials †	3
LAH 2802	LAH Summer Internship Review	1
		16

Spring Term

BIO 2030	Plant Pathology	3
BUS 2210	Small Business Management	3
ELE XXXX	AH/SS elective	3
ENG 2080	Technical Communication	3
LAH 1040	Greenhouse Management	3
LAH 2730	Landscape Contracting Seminar	1
		16

Courses marked with † are offered every other year.

Veterinary Technology (AAS)

A student with an Associate of Applied Science in Veterinary Technology will be able to:

1. Demonstrate competence in veterinary facility management utilizing appropriate professional and client communication skills and maintaining ethical standards according to applicable laws and codes of the veterinary technology field
2. Exhibit a technical level of competency in the safe and effective preparation, administration, and dispensation of medications (including controlled drugs) using proper dosage calculations, labeling, and record-keeping
3. Demonstrate entry-level skills in patient nursing care for both companion and food animals including husbandry; nutrition; restraint techniques; patient data and sample collection; administration of therapeutics; and basic dental prophylaxis
4. Safely and effectively manage patients and associated equipment in all phases of anesthetic procedures
5. Integrate all aspects of patient, environment, and equipment management for common surgical procedures in a variety of animal species
6. Handle, store, ship, and properly analyze lab specimens
7. Safely and effectively produce diagnostic radiographic and non-radiographic images and operate and maintain the associated equipment
8. Safely and effectively handle and provide care for lab, avian, and exotic animals

The student must adhere to the policies and procedures in the program's student handbook, including safety issues related to pregnancy, immunizations, and substance abuse. They must also receive human prophylactic rabies vaccine, which is available through the college in the fall term at the students' expense or can be administered with a doctor's prescription.

The student must satisfactorily complete all AVMA-required tasks for each course to receive a grade in that course. BIO 2320 and all VET courses must be completed with a grade of *C* or better to graduate. Any student who fails to achieve a *C* or better in any core VET/BIO course after two attempts is dropped from the program. Returning students who need to repeat courses are placed in them as space is available.

The minimum number of credits required for the degree is 64.

First Year

Fall Term			Spring Term		
BIO 2320	Zoology	4	CIS 1050	Introduction to Spreadsheets	1
ENG 1061	English Composition	3	VET 1020	Animal Anatomy & Physiology	4
MAT 1440	Applied Mathematics for Health Sciences	3	VET 1040	Animal Diseases	4
VET 1030	Animal Care & Restraint	3	VET 1052	Animal Care II*	1
VET 1051	Animal Care I*	1	VET 1060	Lab Techniques	4
VET 2080	Animal Behavior	2			
		16			**14**

Second Year

Fall Term			Spring Term		
ELE XXXX	AH/SS elective	3	ELE XXXX	AH/SS elective	3
ENG 2080	Technical Communication	3	VET 2012	Veterinary Clinical Techniques II	3
VET 2011	Veterinary Clinical Techniques I	4	VET 2030	Animal Nutrition	2
VET 2050	Applied Lab Methods	4	VET 2040	Reproduction & Genetics	3
VET 2070	Pharmacology & Toxicology	3	VET 2060	Veterinary Office Procedures	3
VET 2720	Veterinary Supervisor*	1	VET 2090	Vet Tech National Exam Seminar	1
VET 2802	VET Summer Externship Review	1	**optional**		
			VET 2720	Veterinary Supervisor*	1
		18			**16-17**

**Must be taken at least once; may be repeated for credit*

School of Engineering & Computing

Computer Science Advanced Certificates

These certificates are designed for the student who has already earned a degree from an accredited institution and wants to obtain higher-level skills. A student pursuing these certificates should have prior academic work or equivalent work experience.

To earn a certificate, a student must maintain a cumulative GPA for the entire certificate of at least 3.0. Courses in which the final grade is below a *C* don't count toward the certificate, but a subsequent course may be substituted with permission. For a student with a particularly strong background, up to two courses may be waived with permission.

Advanced Software Development (AC)

A student with a certificate in Advanced Computer Software Development will be able to:

1. Identify and effectively describe a user's problem and design and develop an appropriate software solution
2. Apply knowledge of computer science fundamentals to develop high-quality software applications
3. Use a relational database to solve information management problems

The minimum number of credits required for the certificate is 19.

First Year

Fall Term			Spring Term		
CIS XXXX	CIS elective	3	CIS 3010	Database Systems	4
CIS 3050	Algorithms & Data Structures	3	CIS 3030	Programming Languages	3
CIS 4150	Software Engineering	3	CIS 4120	Systems Analysis & Design	3
		9			**10**

Computer Networking (AC)

A student with a certificate in Computer Networking will be able to:

1. Use routing and switching concepts to solve computer networking problems
2. Design and implement complex computer networks
3. Administer systems to provide shared services, including those that employ UNIX-based operation systems

The minimum number of credits required for the certificate is 19.

First Year

Fall Term			Spring Term		
CIS 2230	System Administration	4	CIS 2235	Advanced System Administration	4
CIS XXXX	CIS elective	3	CIS 3250	Advanced Network Architectures	4
CIS 3210	Network Routing & Switching Concepts	4			
		11			**8**

Cybersecurity (AC)

A student with a certificate in Cybersecurity will be able to:

1. Understand the concepts and applications of security algorithms and protocols
2. Design information systems that are resistant to internal and external threats and verify the design's effectiveness
3. Understand the concept of intrusion detection and forensic analysis
4. Understand laws, regulations, policies, and ethics as they relate to cybersecurity

5. Understand current and emerging threats and threat vectors at the strategic and operational levels

The minimum number of credits required for the certificate is 18.

First Year

Fall Term			Spring Term		
CIS 4011	Information Warfare	3	CIS 4040	Computer Security	3
CIS 4240	Ethical Hacking & Network Defense	3	CIS 4080	Network Security	3
CIS 4310	Computer Forensics	3	CIS 4241	Advanced Ethical Hacking	3
		9			**9**

Software Development (AC)

A student with a certificate in Computer Software Development will be able to:

1. Program proficiency in an object-oriented programming language
2. Develop and maintain static and simple dynamic web pages, including those connected to databases
3. Install, monitor, and maintain simple computer networks

The minimum number of credits required for the certificate is 19.

First Year

Fall Term			Spring Term		
CIS 1151	Website Development	3	CIS 1152	Advanced Website Development	3
CIS 2260	Object-Oriented Programming	3	CIS 2151	Networks I	4
CIS 2320	Software Quality Assurance & Testing	3	**select one**		
			CIS 2010	Computer Organization	4
			CIS 2730	Software Engineering Projects	3
		9			**10-11**

Web Development (AC)

A student with a certificate in Web Development will be able to:

1. Develop and maintain static and simple dynamic web pages, including those connected to databases
2. Use relational databases to solve information management problems

The minimum number of credits required for the certificate is 24.

First Year

Fall Term			Spring Term		
CIS 1151	Website Development	3	CIS 1152	Advanced Website Development	3
CIS 2230	System Administration	4	CIS 2450	Advanced Web Technologies	3
CIS XXXX	CIS elective	3	CIS 3010	Database Systems	4
select one			**as required**		
CIS 2261	Introduction to Java Programming I	4	CIS 2262	Introduction to Java Programming II	3
CIS 2271	Java Programming	4			
		14			**10-13**

Architectural & Building Engineering Technology (AAS)

A student with an Associate of Applied Science in Architectural & Building Engineering Technology will be able to:

1. Apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to the discipline
2. Design solutions for well defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline
3. Apply written, oral, and graphical communication in well-defined technical and non-technical environments
4. Identify and use appropriate technical literature
5. Conduct standard tests, measurements, and experiments and analyze and interpret results
6. Function effectively as a member of a technical team

Educational objectives that are demonstrated during their workforce careers include:

- **Professional skills:** be immediately productive in the workplace
- **Management skills:** handle workload responsibility based on knowledge of necessary skills
- **Engineering skills:** demonstrate knowledge of theory and ability to perform workload applications
- **Innovation skills:** engage in post-degree learning and adapt to new and changing technologies

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 65.

First Year

Fall Term			Spring Term		
ARE 1000	ARE Freshman Seminar	1	ARE 1210	Construction Materials & Methods	5
ARE 1011	Introduction to Construction Drawing	3	INT 1005	Self, Career, & Culture	3
ARE 1220	Architectural History	3	MAT 1312	Precalculus II	3
ENG 1061	English Composition	3	PHY 1042	Physics II	4
MAT 1311	Precalculus I	3			
PHY 1041	Physics I	4			
		17			**15**

Second Year

Fall Term			Spring Term		
ARE 2022	Building Information Modeling	3	ARE 2032	Environmental Systems II	3
ARE 2031	Environmental Systems I	3	ARE 2052	Architectural Design II	3
ARE 2051	Architectural Design I	3	ARE 2720	Architect & Building Engineering Seminar	1
CET 2040	Statics & Strength of Materials	4	CET 2120	Structural Design	3
MAT 1520	Calculus for Engineering	4	ELE XXXX	AH/SS elective	3
			ENG 2080	Technical Communication	3
		17			**16**

Architectural Engineering Technology (BS)

A student with a Bachelor of Science in Architectural Engineering Technology will be able to:

1. Apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline
2. Design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline
3. Apply written, oral, and graphical communication in broadly defined technical and non-technical environments and dentify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments and analyze and interpret results to improve processes
5. Function effectively as a member and a leader on technical teams

Educational objectives that are demonstrated during their workforce careers include:

- **Engineering skills:** analyze, design, and implement building-related systems and products
- **Engineering management skills:** handle administrative, personnel, and technical project issues through appropriate management techniques
- **Design skills:** demonstrate competence and creativity in the design of systems, components, or processes by researching and developing appropriate solutions to problems and using a variety of tools and techniques in their work
- **Innovation skills:** engage in post-degree learning and adapt to new and changing technologies

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 124.

Third Year

Fall Term

CORE CURRICULUM		
ARE 3020	Structural Analysis	3
ARE 3050	Fundamentals Fluids & Thermodynamics	4
ELT 2071	Basic Electricity	3
ARCHITECTURAL ENGINEERING TRACK		
ARE 2040	Construction Practices	3
MAT 2532	Calculus II	4
CIVIL ENGINEERING TRACK		
ARE 2022	Building Information Modeling	3
select one		
PHY 1042	Physics II	4
PHY 2042	Physics II with Calculus	4
		17

Spring Term

CORE CURRICULUM		
ARE 3030	Steel Structures Design	4
ARE 3040	Electrical/Lighting Systems	3
ARE 4030	HVAC Systems	5
ARCHITECTURAL ENGINEERING TRACK		
CHE 1031	General Chemistry I	4
CIVIL ENGINEERING TRACK		
ARE 1210	Construction Materials & Methods Studio	1
		13-16

Fourth Year

Fall Term

CORE CURRICULUM		
ARE 3010	Design Systems Integration	3
ARE 4010	Concrete Structures Design	3
ARE 4020	Architectural Engineering Management	3
ARE 4050	FE Exam Survey	1
ELE XXXX	AH/SS elective	3
CIVIL ENGINEERING TRACK		
MAT 2532	Calculus II	4
		13-17

Spring Term

ARE 4040	Plumbing Systems	3
ARE 4720	ARE Senior Project	4
ELE XXXX	AH/SS elective	3
XXX XXXX	Elective	3
		13

Civil & Environmental Engineering Technology (AE)

Any student completing this program can continue for a 2+2 bachelor's degree in Architectural Engineering Technology, Business Technology & Management, Construction Management, or Renewable Energy.

A student with an Associate of Engineering in Civil & Environmental Engineering Technology will be able to:

1. Apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to the discipline
2. Design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline
3. Apply written, oral, and graphical communication in well-defined technical and non-technical environments and identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments and analyze and interpret results
5. Function effectively as a member of a technical team
6. Conduct sampling of environmental media
7. Perform field and laboratory measurements of environmental parameters, including the use of common instruments and equipment appropriate to environmental technology
8. Apply quality control methods in sampling and measurement, and utilize basic statistical techniques in analysis of the results
9. Prepare reports to adequately describe results of environmental sampling and measurement
10. Explain operating principles for a range of unit processes for environmental control
11. Perform CAD and GIS operations and apply them to solve engineering problems

Educational objectives that are demonstrated during their workforce careers include:

- **Communication skills:** communicate technical information in writing, speaking, listening, and interpersonal skills to work effectively as part of a team in the workforce
- **Technical skills:** understand the principles of storm water, hydraulics, environmental engineering, surveying, soils, engineering structures, wastewater, water/wastewater treatment, and engineering materials; estimate quantities; and use appropriate computer applications to apply that knowledge as a consultant in the workforce
- **Professional skills:** perform in the workforce with confidence in the use of CAD software; create site plans from raw survey data; design sewage disposal systems; and develop profiles and cross-sections for highway design
- **Engineering design skills:** understand design principles and function actively as part of a design team in the workforce with acquired skills and the knowledge of building materials and structures, site development, and estimating quantities
- **Innovation skills:** demonstrate the skills and ability needed to continue learning through formal education or adapt to changing technologies in the workplace

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 65.

First Year

Fall Term

CET 1000	CET Freshman Orientation	1
CET 1011	Surveying I	3
CET 1031	Engineering & Surveying Computer Apps I	2
ENG 1061	English Composition	3
MAT 1311	Precalculus I	3
PHY 1041	Physics I	4
		16

Spring Term

CET 1020	Engineering Materials	3
CET 1032	Engineering & Surveying Computer Apps II	2
CHE 1031	General Chemistry I	4
ENG 2080	Technical Communication	3
INT 1005	Self, Career, & Culture	3
MAT 1312	Precalculus II	3
		18

Second Year

Fall Term

CET 2012	Surveying II	4
CET 2020	Hydraulics & Drainage	3
CET 2040	Statics & Strength of Materials	4
MAT 1520	Calculus for Engineering	4
		15

Spring Term

CET 2030	Environmental Engineering & Science	3
CET 2050	Civil & Environmental Design	4
CET 2110	Mechanics of Soils	3
CET 2120	Structural Design	3
ELE XXXX	AH/SS elective	3
		16

Computer Engineering Technology (AE)

A student with an Associate of Engineering in Computer Engineering Technology will be able to:

1. Apply the knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve narrowly defined engineering problems appropriate to the discipline
2. Design solutions for narrowly defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline
3. Apply written, oral, and graphical communication in narrowly defined technical and non-technical environments; identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments related to the discipline and interpret results to improve processes
5. Function effectively as a member of a technical team

Educational objectives that are demonstrated during their workforce careers include:

- **Professional skills:** be immediately employable and productive in the workplace
- **Engineering management skills:** possess qualifications for positions of responsibility based on knowledge of necessary skills
- **Engineering skills:** demonstrate knowledge in both theory and application
- **Innovation skills:** engage in lifelong learning; adapt to new and emerging technologies; and continue their formal education

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 64.

First Year

Fall Term

ELT 1015	Introduction to Engineering	1
ELT 1031	Electrical Circuits I	4
MAT 1311	Precalculus I	3
PHY 1041	Physics I	4
select one		
CIS 2261	Introduction to Java Programming I	4
CIS 2271	Java Programming	4
		16

Spring Term

ELT 1110	Introduction to Digital Circuits	3
ELT 2041	Electronic Circuits I	4
ENG 1061	English Composition	3
INT 1005	Self, Career, & Culture	3
MAT 1312	Precalculus II	3
as required		
CIS 2262	Introduction to Java Programming II	3
		16-19

Second Year

Fall Term

CIS 1151	Website Development	3
ELT 2015	Introduction to Projects	1
ELT 2050	Microcomputer Techniques	4
MAT 1520	Calculus for Engineering	4
PHY 1042	Physics II	4
		16

Spring Term

CIS 2010	Computer Organization	4
CIS 2151	Networks I	4
ELE XXXX	AH/SS elective	3
ENG 2080	Technical Communication	3
select one		
CIS 2730	Software Engineering Projects	3
ELT 2720	Electrical Project	2
		16-17

Computer Engineering Technology (BS)

A student with a Bachelor of Science in Computer Engineering Technology will be able to:

1. Apply the knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline
2. Design solutions for broadly defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline
3. Apply written, oral, and graphical communication in broadly defined technical and non-technical environments; identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments related to the discipline and interpret results to improve processes
5. Function effectively as a member of a technical team

Educational objectives that are demonstrated during their workforce careers include:

- **Engineering skills:** demonstrate knowledge in both theory and application and analyze, design, and implement electrical and computer systems and products
- **Engineering management skills:** apply project management techniques to electrical/computer systems and qualify for positions of responsibility
- **Design skills:** demonstrate creativity in the design of systems, components, or processes by researching and developing multiple solutions to problems and using a variety of tools and techniques in their work

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 123.

Third Year

Fall Term

CIS 3050	Algorithms & Data Structures	3
CIS 4150	Software Engineering	3
MAT 2532	Calculus II	4
as required		
ELT 3010	Digital Circuits II †	3
ELT 3070	Semiconductor Technology †	3
as required		
ELE XXXX	AH/SS elective	3
ELT 4010	Computer Architecture †	3
		16

Spring Term

ELT 3050	Microprocessor Techniques II	4
MAT 3720	Topics in Discrete Math	3
select two		
XXX XXXX	Elective	3
		13

Fourth Year

Fall Term

CIS 4020	Operating Systems	4
CIS 4721	CIS Senior Project I	2
select three		
ELE XXXX	AH/SS elective	3
ELT 4010	Computer Architecture †	3
XXX XXXX	Elective	3
		15

Spring Term

CIS 4722	CIS Senior Project II	3
ELE XXXX	AH/SS elective	3
ELT 4020	Digital Signal Processing	3
select two		
XXX XXXX	Elective	3
		15

Courses marked with † are offered every other year.

Computer Information Technology (AS)

A student with an Associate of Science in Computer Information Technology will be able to:

1. Understand fundamental programming concepts and write simple programs to help maintain systems
2. Develop and maintain static and simple dynamic web pages, including those connected to databases
3. Install, monitor, and maintain simple computer networks
4. Administer systems to provide shared services, including those that employ UNIX-based operations systems
5. Understand the historical and social context of information technology

The minimum number of credits required for the degree is 62.

First Year

Fall Term

CIS 1120	Introduction to Information Technology	3
CIS 1151	Website Development	3
ENG 1061	English Composition	3
MAT 1311	Precalculus I	3
select one		
CIS 2261	Introduction to Java Programming I	4
CIS 2271	Java Programming	4
		16

Spring Term

CIS 1152	Advanced Website Development	3
CIS 2151	Networks I	4
ELE XXXX	AH/SS elective	3
select one		
MAT 1312	Precalculus II	3
MAT 2021	Statistics	3
MAT 2120	Discrete Structures	3
as required		
CIS 2262	Introduction to Java Programming II	3
		13-16

Second Year

Fall Term

BUS 2270	Interpersonal & Oral Communication	3
CIS 2230	System Administration	4
CIS 2320	Software Quality Assurance & Testing	3
SCI XXXX	Science elective	4
XXX XXXX	Elective	3
		16

Spring Term

CIS 2235	Advanced System Administration	4
CIS XXXX	CIS elective	3
ELE XXXX	AH/SS elective	3
ENG 2080	Technical Communication	3
select one		
MAT 1312	Precalculus II	3
MAT 2021	Statistics	3
MAT 2120	Discrete Structures	3
		17

Computer Information Technology (BS)

In addition to the student outcomes included in the associate program, a student with a Bachelor of Science in Computer Information Technology will be able to:

1. Use relational databases to solve information management problems
2. Apply best security practices to safeguard information systems
3. Apply significant technical knowledge in their field of study to solve technical problems
4. Work effectively as a member of a team to design, develop, and implement solutions to technical problems
5. Make ethical professional decisions in their careers

All students actively participate in the design, development, and evaluation of a sizable information technology system and present the results of that effort.

The student, in conjunction with the Department Chair, may develop a sequence of courses to best meet their background and needs that still satisfies the degree requirements. A typical curriculum is shown here.

The minimum number of credits required for the degree is 120.

Third Year

Fall Term

BUS 2440	Introduction to Business Law	3
CIS 4040	Computer Security	3
CIS 4150	Software Engineering	3
ELE XXXX	AH/SS elective	3
XXX XXXX	Elective	3
		15

Spring Term

BUS 4530	Technical Project Management	3
CIS 3010	Database Systems	4
CIS 4120	Systems Analysis & Design	3
ELE XXXX	AH/SS elective	3
HUM 3060	Cyberethics	3
		16

Fourth Year

Fall Term

CIS 4721	CIS Senior Project I	2
SCI XXXX	Science elective	4
select three		
XXX XXXX	Elective	3
		15

Spring Term

CIS 4722	CIS Senior Project II	3
select three		
XXX XXXX	Elective	3
		12

Computer Software Engineering (AS)

A student with an Associate of Science in Computer Software Engineering will be able to:

1. Program proficiently in multiple programming languages
2. Develop and maintain static and simple dynamic web pages, including those connected to databases
3. Understand the processes used in software development and use tools to support these processes
4. Understand how computer hardware impacts the running of software down to the level of assembly language
5. Independently learn new, well-defined technology frameworks
6. Understand the historical and social context of information technology

All students actively participate in the design and development of a software system and present the results of that effort.

The student, in conjunction with the Department Chair, may develop a sequence of courses to best meet their background and needs that still satisfies the degree requirements. A typical curriculum is shown here.

The minimum number of credits required for the degree is 61.

First Year

Fall Term

CIS 1120	Introduction to Information Technology	3
CIS 1151	Website Development	3
ENG 1061	English Composition	3
MAT 1311	Precalculus I	3
select one		
CIS 2261	Introduction to Java Programming I	4
CIS 2271	Java Programming	4
		16

Spring Term

CIS 1152	Advanced Website Development	3
CIS 2151	Networks I	4
ELE XXXX	AH/SS elective	3
select one		
MAT 1312	Precalculus II	3
MAT 2021	Statistics	3
MAT 2120	Discrete Structures	3
as required		
CIS 2262	Introduction to Java Programming II	3
		13-16

Second Year

Fall Term

CIS 2230	System Administration	4
CIS 2260	Object-Oriented Programming	3
CIS 2320	Software Quality Assurance & Testing	3
SCI XXXX	Science elective	4
select one		
BUS 2020	Principles of Management	3
MAT 1520	Calculus for Engineering	4
		17

Spring Term

CIS 2010	Computer Organization	4
CIS 2730	Software Engineering Projects	3
ELE XXXX	AH/SS elective	3
ENG 2080	Technical Communication	3
as required		
MAT 2021	Statistics	3
MAT 2120	Discrete Structures	3
		13-17

Computer Software Engineering (BS)

In addition to the student outcomes included in the associate program, a student with a Bachelor of Science in Computer Software Engineering will be able to:

1. Use a relational database to solve information management problems
2. Identify and effectively describe a user's problem and design and develop an appropriate software solution
3. Apply knowledge of computer science fundamentals to develop high-quality software applications
4. Apply significant technical knowledge in their field of study to solve technical problems
5. Effectively work as a member of a team to design, develop, and implement solutions to technical problems
6. Make ethical professional decisions in their career

All students actively participate in the design, development, and evaluation of a sizable software system and present the results of those efforts.

The student, in conjunction with the Department Chair, may develop a sequence of courses to best meet their background and needs that still satisfies the degree requirements. A typical curriculum is shown here.

The minimum number of credits required for the degree is 122.

Third Year

Fall Term			Spring Term		
CIS 3050	Algorithms & Data Structures	3	BUS 4530	Technical Project Management	3
CIS 4150	Software Engineering	3	CIS 3010	Database Systems	4
SCI XXXX	Science elective	4	CIS 3030	Programming Languages	3
select two			CIS 4120	Systems Analysis & Design	3
XXX XXXX	Elective	3	ELE XXXX	AH/SS elective	3
		16			**16**

Fourth Year

Fall Term			Spring Term		
CIS XXXX	CIS elective	3	CIS XXXX	CIS elective	3
CIS 4020	Operating Systems	4	CIS 4722	CIS Senior Project II	3
CIS 4721	CIS Senior Project I	2	ELE XXXX	AH/SS elective	3
select two			HUM 3060	Cyberethics	3
XXX XXXX	Elective	3	XXX XXXX	Elective	3
		15			**15**

Computer Software Engineering (MS)

A student with a Master of Science in Software Engineering will be able to:

1. Implement and analyze sophisticated algorithms and data structures
2. Analyze the artifacts created during the software development process
3. Know a range of distinct architectural styles, their appropriateness for problems, and possible organizational strategies for adoption
4. Choose, read, and evaluate academic and industry publications

The minimum number of credits required for the degree is 45.

Fifth Year

Fall Term			Spring Term		
CIS 5020	Advanced Operating Systems	4	CIS 5120	Advanced Systems Analysis & Design	3
CIS 5050	Advanced Data Structures & Algorithms	3	CIS 5140	Software Architecture	3
CIS 5150	Advanced Software Engineering	3	CIS 6050	Advanced Compiler Design	3
CIS 6740	Graduate Seminar I	1	CIS 6741	Graduate Seminar II	1
		11			**10**

Sixth Year

Fall Term			Spring Term		
CIS 5130	Analysis of Software Artifacts	3	CIS 6721	Master's Project	6
select three			**select two**		
CIS XXXX	CIS elective	3	CIS XXXX	CIS elective	3
		12			**12**

Electrical Engineering Technology (AE)

A student with an Associate of Engineering in Electrical Engineering Technology will be able to:

1. Apply the knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to the discipline
2. Design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline
3. Apply written, oral, and graphical communication in well-defined technical and non-technical environments and identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments related to the discipline and analyze and interpret results
5. Function effectively as a member of a technical team

Educational objectives that are demonstrated during their workforce careers include:

- **Professional skills:** be immediately employable and productive in the workplace
- **Engineering management skills:** possess qualifications for positions of responsibility based on knowledge of necessary skills
- **Engineering skills:** demonstrate knowledge in both theory and application
- **Innovation skills:** engage in lifelong learning and adapt to new and emerging technologies; continue their formal education

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 64.

First Year

Fall Term			Spring Term		
ELT 1015	Introduction to Engineering	1	CIS 2025	C Programming	3
ELT 1031	Electrical Circuits I	4	ELT 1110	Introduction to Digital Circuits	3
ENG 1061	English	3	ELT 2041	Electronic Circuits I	4
MAT 1311	Precalculus I	3	INT 1005	Self, Career, & Culture	3
PHY 1041	Physics I	4	MAT 1312	Precalculus II	3
		15			**16**

Second Year

Fall Term			Spring Term		
ELT 1032	Electrical Circuits II	4	ELE XXXX	AH/SS elective	3
ELT 2015	Introduction to Projects	1	ELT 2042	Electronic Circuits II	4
ELT 2050	Microcomputer Techniques	4	ELT 2130	Industrial Electronics	4
MAT 1520	Calculus for Engineering	4	ELT 2720	Electrical Project	2
PHY 1042	Physics II	4	ENG 2080	Technical Communication	3
		17			**16**

Electrical Engineering Technology (BS)

In addition to the student outcomes included in the associate program, a student with a Bachelor of Science in Electrical Engineering Technology will be able to:

1. Apply the knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline
2. Design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline
3. Apply written, oral, and graphical communication in broadly defined technical and non-technical environments and identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments related to the discipline and interpret results to improve processes
5. Function effectively as a member or leader of a technical team

Educational objectives that are demonstrated during their workforce careers include:

- **Engineering skills:** analyze, design, and implement electrical and electronic systems and products
- **Engineering management skills:** apply project management techniques to electrical/ electronic systems; be immediately employable and productive in the workplace
- **Design skills:** demonstrate creativity in the design of systems, components, or processes by researching and developing multiple solutions to problems and using a variety of tools and techniques in their work
- **Innovation skills:** engage in lifelong learning and adapt to new and emerging technologies; continue their formal education

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 123.

Third Year

Fall Term			Spring Term		
ELE XXXX	AH/SS elective	3	ELT 2061	Electromechanical Systems I	4
ELM 3015	Sensors & Instrumentation	3	ELT 3050	Microprocessor Techniques II	4
ELT 3053	Electronics III	4	MAT 3170	Applied Mathematics for Engineering	3
MAT 2532	Calculus II	4	XXX XXXX	Elective	3
as required					
ELT 3010	Digital Circuits II †	3			
ELT 3070	Semiconductor Technology †	3			
		17			**14**

Fourth Year

Fall Term			Spring Term		
ELE XXXX	AH/SS elective	3	ELM 4232	Control Systems II	3.5
ELM 4015	Electromechanical Power Systems	3.5	ELT 3040	Electronic & Data Communications	3.5
ELM 4231	Control Systems I	3.5	ELT 4020	Digital Signal Processing	3
ELT 4701	Electrical Project I	2	ELT 4702	Electrical Project II	3
XXX XXXX	Elective	3			
		15			**13**

Three of the program's general education credits are included in ELT 4701 and 4702. One technical elective must be 2000 or higher. Courses marked with † are offered every other year.

Electromechanical Engineering Technology (BS)

A student with a Bachelor of Science in Electromechanical Engineering Technology will be able to:

1. Apply the knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline
2. Design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline
3. Apply written, oral, and graphical communication in broadly defined technical and non-technical environments; identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments related to the discipline and interpret results to improve processes
5. Function effectively as a member or leader of a technical team

Educational objectives that are demonstrated during their workforce careers include:

- **Engineering skills:** analyze, design, and implement electromechanical systems and products
- **Engineering management skills:** qualify for positions of responsibility and apply project management techniques to electromechanical systems; be immediately employable and productive in the workplace
- **Design skills:** demonstrate creativity in the design of systems, components, or processes by researching and developing multiple solutions to problems and using a variety of tools and techniques in their work
- **Innovation skills:** prepare for lifelong learning, adapt to new and emerging technologies; continue their formal education

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 125.

Third Year

Fall Term

CORE CURRICULUM		
ELM 3015	Sensors & Instrumentation	3
MAT 2532	Calculus II	4
ELECTRICAL ENGINEERING TRACK		
MEC 1011	Design Communication I	2
MEC 2010	Fluid Mechanics & Fluid Systems	4
MEC 2035	Statics & Strength of Materials	3
MECHANICAL ENGINEERING TRACK		
CIS 2025	C Programming	4
ELT 1032	Electrical Circuits II	4
		15-16

Spring Term

CORE CURRICULUM		
ELT 2061	Electromechanical Systems I	4
MAT 3170	Applied Mathematics for Engineering	3
XXX XXXX	Elective	3
ELECTRICAL ENGINEERING TRACK		
MEC 1020	Manufacturing Processes I Lab	2
MEC 2065	Kinematics & Dynamics	3
MEC 2071	Machine Design	2
MECHANICAL ENGINEERING TRACK		
ELT 2041	Electronic Circuits I	4
ELT 2050	Microcomputer Techniques	4
		17-18

Fourth Year

Fall Term

ELE XXXX	AH/SS elective	3
ELM 4015	Electromechanical Power Systems	3.5
ELM 4231	Control Systems I	3.5
ELM 4701	Electromechanical Project I	2
XXX XXXX	Elective	3
		15

Spring Term

ELE XXXX	AH/SS elective	3
ELM 4232	Control Systems II	3.5
ELM 4702	Electrical Project II	3
ELT 3040	Electronic & Data Communications	3.5
		13

**General education requirements for this program include a cumulative 24 credits, nine of which must contain a strong writing component and three of which must be at the 3000 level. Three of the 24 credits are included in* ELM 4701 *and* 4702*. One technical elective must be 2000 or higher.*

General Engineering Technology

Administered by the college's Continuing Education & Workforce Development (CEWD) office, GET degree programs are industry-sponsored and offered primarily at the facilities of sponsoring organizations. The curriculum consists of initial courses common to all GET degree programs, as well as a sequence of technology foundation and technical emphasis courses specific to the needs of a workforce education population. These industry-specific technical courses are developed by a curriculum development team comprised of Vermont Tech faculty and representatives from the sponsoring organizations. The goal is a flexible, interdisciplinary path to the acquisition of basic engineering concepts and specific job-related skills needed for the student to excel in their current position and prepare for career growth.

General Education

ELE 2XXX	AH elective	3
ELE 2XXX	SS elective	3
ENG 1061	English Composition	3
ENG 2080	Technical Communication	3
MAT XXXX	Mathematics elective	4
SCI XXXX	Science elective	4
		20

Foundation

These courses provide a general educational foundation appropriate to the particular technical emphasis. Foundation courses should satisfy the following requirements and can't be used to satisfy a general education or technical emphasis course requirement:

select two		
CIS XXXX	CIS elective	3
select two		
COM XXXX	Communications elective	3
MAT XXXX	Advanced math elective	5
SCI XXXX	Advanced science elective	4
XXX XXXX	Elective	3
		24

Technical Emphasis

In addition to completing general education and foundation requirements, the student completes a combination of technical courses based on the degree emphasis. That includes lab or hands-on components to build troubleshooting and problem-solving skills and provide exposure to course topics; integration of theoretical topics with practical skills; at least one multi-course sequence consisting of 1000- and 2000-level courses; and a capstone experience which requires the student to call upon the comprehensive skills and knowledge gained in the program.

Manufacturing Engineering Technology (BS)

A student with a Bachelor of Science in Manufacturing Engineering Technology will be able to:

1. Apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline
2. Design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline
3. Apply written, oral, and graphical communication in broadly defined technical and non-technical environments and identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments and analyze and interpret results to improve processes
5. Function effectively as a member as well as a leader on technical teams

Educational objectives that are demonstrated during their workforce careers include:

- **Engineering skills:** apply technical knowledge and leadership skills to contribute to manufacturing competitiveness through process and systems design, operations, quality, continuous improvement, lean manufacturing, and sustainability
- **Communication skills:** employ strong communication, leadership, and teamwork skills and participate productively on a professional team
- **Innovation skills:** Develop and continuously improve in a career in manufacturing or a related field

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

Minimum degree requirements are listed on the program page. A typical curriculum is shown below.

The minimum number of credits required for the degree is 122.

First Year

Fall Term			Spring Term		
ENG 1061	English Composition	3	ENG 2080	Technical Communication	3
MAT 1311	Precalculus I	3	INT 1005	Self, Career, & Culture	3
MEC 1010	Introduction to Mechanical Engineering	1	MAT 1312	Precalculus II	3
MEC 1011	Design Communication I	2	MEC 1012	Design Communication II	2
MEC 1020	Manufacturing Processes I	2	MEC 1040	Introduction to Materials Sci & Eng	3
PHY 1041	Physics I	4	PHY 1042	Physics II	4
		15			**18**

Second Year

Fall Term			Spring Term		
ELT 2071	Basic Electricity	3	ELE XXXX	AH/SS elective	3
MAT 1520	Calculus for Engineering	4	ELT 2072	Electronics	3
MEC 2010	Fluid Mechanics & Fluid Systems	3	MEC 2050	Thermodynamics & Heat Transfer	4
MEC 2035	Statics & Strength of Materials	4	MEC 2065	Kinematics & Dynamics	3
MEC 2040	Computer-Aided Technology	2	MEC 2720	Mechanical Projects	3
		16			**16**

Third Year in Odd Academic Years (AY21)

Fall Term			Spring Term		
BUS 2020	Principles of Management	3	BUS 4530	Technical Project Management	3
MAT 2021	Statistics	3	CHE 1020	Introduction to Chemistry	4
MEC 3031	Materials Processes	3	ELE XXXX	AH/SS elective	3
MEC 3120	Advanced Manufacturing & Automation	3	MEC 3041	Advanced CNC Machining	3
MEC 4020	Quality Assurance	3	MEC 4010	Lean Manufacturing	3
		15			**16**

Third Year in Even Academic Years (AY22)

Fall Term			Spring Term		
BUS 2020	Principles of Management	3	BUS 2210	Small Business Management	3
BUS 3150	Production & Operations Management	3	BUS 4530	Technical Project Management	3
MAT 2021	Statistics	3	CHE 1020	Introduction to Chemistry	4
MEC 1060	Metrology & Inspection Techniques	3	ELE XXXX	AH/SS elective	3
MEC 3021	Manufacturing Processes II	3	MEC 3121	Additive Manufacturing	3
		15			**16**

Fourth Year in Odd Academic Years (AY21)

Fall Term			Spring Term		
MEC 3031	Materials Processes	3	ELE XXXX	AH/SS elective	3
MEC 3120	Advanced Manufacturing & Automation	3	MEC 3041	Advanced CNC Machining	3
MEC 4020	Quality Assurance	3	MEC 4010	Lean Manufacturing	3
MEC 4220	Product Design & Production	3	MEC 4721	Manufacturing Capstone Project	3
		12			**12**

Fourth Year in Even Academic Years (AY22)

Fall Term			Spring Term		
BUS 3150	Production & Operations Management	3	BUS 2210	Small Business Management	3
MEC 1060	Metrology & Inspection Techniques	3	ELE XXXX	AH/SS elective	3
MEC 3021	Manufacturing Processes II	3	MEC 3121	Additive Manufacturing	3
MEC 4220	Product Design & Production	3	MEC 4721	Manufacturing Capstone Project	3
		12			**12**

Mechanical Engineering Technology (AE)

A student with an Associate of Engineering in Mechanical Engineering Technology will be able to:

1. Apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to the discipline
2. Design solutions for well-defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline
3. Apply written, oral, and graphical communication in well-defined technical and non-technical environments and identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments and analyze and interpret results
5. Function effectively as a member of a technical team

Educational objectives that are demonstrated during their workforce careers include:

- **Engineering skills:** develop a successful career in manufacturing, design, specification, installation, testing, operation, maintenance, sales, or documentation of mechanical systems
- **Professional skills:** employ strong communication and teamwork skills and participate productively on professional teams of engineers, technicians, managers, and skilled production workers
- **Design skills:** utilize technical knowledge and skills to effectively design, fabricate, manufacture, and maintain industrial and consumer systems and products
- **Innovation skills:** continuously develop as a professional; adapt and stay current in their field

The program is accredited by the Engineering Technology Accreditation Commission of ABET, http://www.abet.org.

The minimum number of credits required for the degree is 65.

First Year

Fall Term

ENG 1061	English Composition	3
MAT 1311	Precalculus I	3
MEC 1010	Introduction to Mechanical Engineering	1
MEC 1011	Design Communication I	2
MEC 1020	Manufacturing Processes I	2
PHY 1041	Physics I	4
		15

Spring Term

ENG 2080	Technical Communication	3
INT 1005	Self, Career, & Culture	3
MAT 1312	Precalculus II	3
MEC 1012	Design Communication II	2
MEC 1040	Introduction to Materials Sci & Eng	3
PHY 1042	Physics II	4
		18

Second Year

Fall Term

ELT 2071	Basic Electricity	3
MAT 1520	Calculus for Engineering	4
MEC 2010	Fluid Mechanics & Fluid Systems	3
MEC 2035	Statics & Strength of Materials	4
MEC 2040	Computer-Aided Technology	2
		16

Spring Term

ELE XXXX	AH/SS elective	3
ELT 2072	Electronics	3
MEC 2050	Thermodynamics & Heat Transfer	4
MEC 2065	Kinematics & Dynamics	3
MEC 2720	Mechanical Projects	3
		16

Renewable Energy (BS)

A student with a Bachelor of Science in Renewable Energy will be able to:

1. Apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, and technology to solve broadly defined problems appropriate to renewable energy
2. Design systems, components, or processes meeting specified needs for broadly defined problems appropriate to renewable energy
3. Apply written, oral, and graphical communication in broadly defined technical and non-technical environments and identify and use appropriate technical literature
4. Conduct standard tests, measurements, and experiments, then analyze and interpret results to improve processes
5. Function effectively as a member as well as a leader on technical teams

Minimum degree requirements are listed on the program page. A typical curriculum is shown below.

The minimum number of credits required for the degree is 120.

First Year

Fall Term

ENG 1061	English Composition	3
MAT 1311	Precalculus I	3
MEC 1010	Introduction to Mechanical Engineering	1
MEC 1011	Design Communication I	2
MEC 1020	Manufacturing Processes I	2
PHY 1041	Physics I	4
		15

Spring Term

INT 1005	Self, Career, & Culture	3
MAT 1312	Precalculus II	3
MEC 1012	Design Communication II	2
MEC 1040	Intro to Materials Science & Engineering	3
PHY 1042	Physics II	4
		15

Second Year

Fall Term

BIO 1020	Introduction to Environmental Biology	4
BUS 2020	Principles of Management	3
ELT 2071	Basic Electricity	3
MAT 1520	Calculus for Engineering	4
MEC 2035	Statics & Strengths of Materials	4
		18

Spring Term

CHE 1031	General Chemistry I	4
ELE XXXX	AH/SS elective	3
ELT 2072	Electronics	3
ENG 2080	Technical Communication	3
SSC 2030	Energy Systems & Sustainability	3
		16

Third Year

Fall Term

CORE CURRICULUM		
as required		
MEC 2150	Intro to Solar Photovoltaic Technology	3
MEC 3010	Wind Power	3
RENEWABLE ENERGY TRACK		
ARE 2031	Environmental Systems I	3
ARE 3050	Fundamentals of Fluids & Thermodynamics	4
		13-17

Spring Term

CORE CURRICULUM		
MAT 2021	Statistics	3
as required		
MEC 3040	Bioenergy	3
MEC 3170	Renewable Energy Heating	3
RENEWABLE ENERGY TRACK		
ARE 2032	Environmental Systems II	3
ELE XXXX	AH/SS elective	3
		12-16

Fall Term

XXX XXXX	Elective	3
ARCHITECTURAL ENGINEERING TRACK		
ARE 3050	Fundamentals of Fluids & Thermodynamics	4
BIO 1020	Introduction to Environmental Biology	4
BUS 2020	Principles of Management	3
ELT 2071	Basic Electricity	3
CIVIL ENGINEERING TRACK		
ARE 2031	Environmental Systems I	3
ARE 3050	Fundamentals of Fluids & Thermodynamics	4
BUS 2020	Principles of Management	3
ELT 2071	Basic Electricity	3
PHY 1042	Physics II	4
ELECTRICAL ENGINEERING TRACK		
ARE 2031	Environmental Systems I	3
ARE 3050	Fundamentals of Fluids & Thermodynamics	4
BIO 1020	Introduction to Environmental Biology	4
BUS 2020	Principles of Management	3
MECHANICAL ENGINEERING TRACK		
ARE 2031	Environmental Systems I	3
BIO 1020	Introduction to Environmental Biology	4
BUS 2020	Principles of Management	3
		13-17

Spring Term

ARCHITECTURAL ENGINEERING TRACK		
CHE 1031	General Chemistry I	4
SSC 2030	Energy Systems & Sustainability	3
CIVIL ENGINEERING TRACK		
ARE 2032	Environmental Systems II	3
SSC 2030	Energy Systems & Sustainability	3
ELECTRICAL ENGINEERING TRACK		
ARE 2032	Environmental Systems II	3
CHE 1031	General Chemistry I	4
SSC 2030	Energy Systems & Sustainability	3
MECHANICAL ENGINEERING TRACK		
ARE 2032	Environmental Systems II	3
CHE 1031	General Chemistry I	4
SSC 2030	Energy Systems & Sustainability	3
		12-16

Fourth Year

Fall Term

ARE 4020	Architectural Engineering Management	3
ELE XXXX	AH/SS elective	3
MEC 4120	Renewable Energy Modeling	3
MEC 4802	MEC Internship Review	1
select one		
BUS 3150	Production & Operations Management	3
BUS 3250	Organizational Behavior & Management	3
as required		
MEC 2150	Intro to Solar Photovoltaic Technology	3
MEC 3010	Wind Power	3
		16

Spring Term

ARE 4030	HVAC Systems	5
BUS 4530	Technical Project Management	3
MEC 4722	Renewable Energy Capstone Project	3
as required		
MEC 3040	Bioenergy	3
MEC 3170	Renewable Energy Heating	3
		14

School of General Education

General Education

Vermont Tech is committed to the intellectual and personal development of every student. Our educational programs foster the development of the whole person. This philosophy also aligns with Vermont Tech's Definition of an Educated Person:

> *Vermont Tech faculty, staff, and students believe that an educated person is one who assumes responsibility for their own learning, for career preparation, and for citizenship. We believe that an educated person consistently strives to reach their full potential, can think critically, is globally aware, is civically engaged, is curious, and is an effective communicator.*

We seek to foster an appreciation in each student for the major domains of human achievement; to provide a common educational experience; to refine ethical reasoning, critical thinking, writing, information literacy, communication, and quantitative and qualitative reasoning skills; to nurture civic, cultural, and global awareness and responsibility; to celebrate diversity and common values; to foster lifelong learning; and to produce a well-rounded graduate.

A baccalaureate graduate from Vermont Tech will be able to:

1. Effectively speak, write, and communicate with a team
2. Exhibit effective scientific and quantitative reasoning and problem-solving skills appropriate to their program field
3. Prove effective qualitative and algorithmic reasoning skills
4. Demonstrate an informed personal, civic, and social awareness
5. Exhibit an informed aesthetic and cultural awareness
6. Establish effective and ethical decision making skills
7. Find and critically consider information from a wide range of sources
8. Demonstrate essential skills and duties expected of professionals in their program field
9. Continuously acquire new concepts, skills, and technologies in their program field

The college doesn't guarantee that general education or elective courses are available and reserves the right to withdraw or restrict enrollment if a class is over-enrolled, under-enrolled, or the availability of faculty or other resources are limited. The student must still complete each requirement prior to receiving a degree. Some courses offered by major departments may fulfill elective requirements only for students who aren't majoring in that department and only if the courses are approved for elective credit.

Course requirements may be fulfilled by simultaneous enrollment at other VSCS schools under the VSCS Consortium Agreement. Students can't use one course to meet more than one requirement within their program except to meet a graduation standard or dual major/degree requirement.

The student works with their advisor to develop a plan to meet the general education elective requirements without requiring additional class loads or terms.

Associate Degree Requirements

Depending on specific program requirements, each associate degree student must complete the following general education requirements to meet the 20 credits minimum:

- 1 credit of information technology
- 3 credits of arts/humanities
- 3 credits of English (composition, writing, and research)
- 3 credits of mathematics/critical thinking
- 3 credits of social sciences
- 3 credits of technical communication
- 4 credits of natural or physical sciences

Bachelor's Degree Requirements

Depending on specific program requirements, each bachelor's degree student must complete the following general education requirements *plus* any other general education courses required to meet the 40 credit minimum:

- 3 credits of English (composition, writing, and research)
- 3 credits of information technology
- 3 credits of technical communication
- 6 credits of arts/humanities(3 credits minimum at the 3000 level in either arts/humanities or social sciences)
- 6 credits of mathematics/critical thinking
- 6 credits of other general education courses
- 6 credits of social sciences (3 credits minimum at the 3000 level in either arts/humanities or social sciences)
- 7 credits of natural or physical sciences

Arts & Humanities & Social Sciences Elective Requirements (AH/SS)

Each student is exposed to methods of inquiry and major concepts in the arts and humanities, human behavior, personality, politics, economics, and the social context of human interaction. Courses at the lower level are offered as survey and special topics courses to expose students to a broad array of concepts and enhance reading, writing, and communication skills. Courses at the upper level require a higher level of learning and understanding. SS electives include survey courses from ECO, GEO, HIS, PSY, and SSC. For current offerings, see the academic scheduling page.

English Requirements

Each student completes ENG 1061 or its equivalent or a sequence of courses that emphasizes reading and writing and requires the successful completion of a research paper. Degree students may satisfy the requirements by completing one of the following as determined by placement: ENG 1042 and 1060; ENG 1060; or ENG 1061.

Each student also completes ENG 2080 which emphasizes the principles and forms of communication in the workplace, including a technical report, and they complete coursework that emphasizes effective speaking, organization, and presentation skills.

Information Technology Requirements

Each student uses computer information technology, including internet orientation, research, email, word processing, and software applications applicable to their field of study.

Mathematics/Critical Thinking Requirements

Each student completes the mathematical or empirical techniques for problem-solving in logic and critical thinking appropriate for their program of study. In addition to the regular mathematics offerings, there are other courses under separate subject listings that satisfy the logic and critical thinking component of this requirement.

Natural Sciences Requirements

Each student explores the natural or physical sciences, including a lab experience. The course of study is determined by the major and can be filled by coursework available as electives. These science courses include BIO, CHE, and PHY, as well as appropriate coursework under other prefixes.

Interdisciplinary Studies

A student with a Bachelor of Science in Interdisciplinary Studies with a focus on Career and Technical Education will be able to:

1. Use their understanding of learning and development theory (cognitive, linguistic, social, emotional, or physical) to design appropriate learning experiences
2. Use their understanding of individual differences to design inclusive learning experiences
3. Use their understanding of diverse cultures and communities to design inclusive learning experiences
4. Design learning environments that support individual learning marked by active engagement
5. Design learning environments that support collaborative learning marked by positive social engagement
6. Accurately communicate central concepts of the discipline they teach
7. Accurately address common misconceptions of the discipline they teach
8. Engage learners in applying perspectives from varied disciplines in authentic contexts, such as local and global issues
9. Integrate cross-disciplinary skills such as critical thinking, creativity, and collaborative problem solving to help learners demonstrate their learning in unique ways
10. Implement multiple methods of assessment to monitor learning progress in order to inform and adjust instructional practice
11. Plan instruction by drawing upon their knowledge of content areas to meet rigorous learning goals
12. Plan instruction by drawing upon their knowledge of learners to meet rigorous learning goals
13. Use a variety of instructional strategies to make the discipline accessible for diverse learners
14. Use a variety of instructional strategies to encourage learners to build skills in order to apply knowledge in meaningful ways
15. Engage in ongoing professional learning
16. Practice their profession in a legal and ethical manner
17. Collaborate with learners, families, colleagues, other school professionals, and community members to ensure student learning
18. Advance the profession through advocacy, leadership, and active research

In addition to completing general education requirements for a bachelor's degree, the student completes a combination of technical courses based on the degree emphasis. That includes lab or hands-on components to build troubleshooting and problem-solving skills and provide exposure to course topics; integration of theoretical topics with practical skills; at least one multi-course sequence consisting of 1000- and 2000-level courses; 12 credits minimum at the 3000 and 4000 levels; and a capstone experience which requires the student to call upon the comprehensive skills and knowledge gained in the program.

The minimum number of credits required for the degree is 120.

EDU 2051	Teaching Methods I	3
EDU 2052	Teaching Methods II	3
EDU 2135	Instruction for Students with Special Needs	3
EDU 2200	Assessment in the CTE Classroom	1
EDU 2802	Educational Externship	1
EDU 3051	Teaching Methods III	3
EDU 3052	Teaching Methods IV	3
EDU 3115	Issues & Trends in Technical Education	3
EDU 4600	Education Capstone	1
PSY 2110	Educational Psychology	3
EDU 3XXX	Elective	16

Enrollment in these courses requires the permission of the Program Director

Technical Education

The Career & Technical Teacher Education Program is an approved Vermont Agency of Education (AOE) alternative educational licensing route for trades and industry teachers at Vermont's secondary regional career and technical centers.

Typically, once a teacher is hired at a regional career and technical center, they enter this three-year program to complete the qualifications for a Vermont Level I Educator License. The teacher-candidate first obtains an apprenticeship license from the AOE, which requires at least a high school diploma and six years of experience in the trades or industry, or an associate degree and at least four years of experience. The teacher-candidate takes education courses and receives support during the next three years from the program.

EDU 2051	Teaching Methods I	3
EDU 2052	Teaching Methods II	3
EDU 2135	Instruction for Students with Special Needs	3
EDU 2200	Assessment in the CTE Classroom	1
EDU 2802	Educational Externship	1
EDU 3051	Teaching Methods III	3
EDU 3052	Teaching Methods IV	3
EDU 3115	Issues & Trends in Technical Education	3
EDU 4600	Education Capstone	1
PSY 2110	Educational Psychology	3
		24

Enrollment in these courses requires the permission of the Program Director

Undeclared Major

A student who has met acceptance requirements but hasn't decided on a specific program of study may be admitted to the college with an undeclared status in either the fall or spring term. The student who might be interested in this program is one who's uncertain about a major, wants to begin college mid-year, wants a lighter credit load, wants a slower pace, or has other plans for subsequent terms. A student who matriculates as undeclared is expected to select a degree program by the end of their second term. When ready to declare, the student applies for a change of program during Registration. Acceptance into a degree program is contingent upon space availability and department approval. Capped programs are handled through Admissions. Once in the program, the student must meet all the requirements of that program for graduation.

Enrollment as undeclared is based on placement, student desire, and class availability. Undeclared status increases the time it takes to complete a degree. No student is eligible to graduate as undeclared and don't have scheduling priority over degree-seeking students.

A minimum of 12 credits are required for full-time status and on-campus residency. Subsequent terms may be scheduled as necessary.

The student, in conjunction with their advisor, may develop a sequence of courses to best meet their background and needs that still satisfies any program requirements. A typical curriculum is shown here.

Fall Term			**Spring Term**		
CORE CURRICULUM			**CORE CURRICULUM**		
ELE XXXX	AH/SS elective	3	ELE XXXX	AH/SS elective	3
ENG 1061	English Composition	3	ENG 2080	Technical Communication	3
ENGINEERING TRACK			**ENGINEERING TRACK**		
MAT 1311	Precalculus I	3	MAT 1312	Precalculus II	3
SCI XXXX	Science elective	4	SCI XXXX	Science elective	4
XXX XXXX	Elective	3	XXX XXXX	Elective	3
HEALTH PROFESSIONS TRACK			**HEALTH PROFESSIONS TRACK**		
BIO 2011	Human Anatomy & Physiology I	4	BIO 2012	Human Anatomy & Physiology II	4
MAT 1440	Applied Mathematics for Health Sciences	3	INT 1005	Self, Career, & Culture	3
select one			**as required**		
BIO 1030	Introduction to Nutrition	3	BIO 1030	Introduction to Nutrition	3
PSY 1010	Introduction to Psychology	3	MAT 1440	Applied Mathematics for Health Sciences	3
PSY 1050	Human Growth & Development	3	PSY 1010	Introduction to Psychology	3
			PSY 1050	Human Growth & Development	3
		16			**16**

School of Nursing & Health Professions

Dental Hygiene (BS)

A student with a Bachelor of Science in Dental Hygiene will be able to:

1. Competently perform the role of a dental hygienist in varied situations and settings
2. Demonstrate the functional acuity and rationale for performing clinical techniques
3. Continually promote the most current concepts of disease control and prevention
4. Emphasize and promote ethical and responsible considerations in patient care
5. Make an essential and unique contribution as an integral member of a healthcare team
6. Demonstrate a basic knowledge of legal responsibilities and ethical considerations of patient care
7. Demonstrate a commitment to continuous and lifelong learning

The Vermont Tech entry-level Dental Hygiene program consists of a three-year CODA-approved associate degree followed by a final online year accredited by NECHE, resulting in a Bachelor of Science in Dental Hygiene. Upon successful completion of either the associate or bachelor's degree, the student is eligible for application for dental hygiene licensure.

All dental hygiene professional courses must be taken in the prescribed six-term sequence. The curriculum is time-intensive and the required courses are rigorous. Complete dedication to coursework is required for successful completion of the program.

The minimum number of credits required for the associate degree is 93.

The minimum number of credits required for the bachelor's degree is 120.

First Year

Fall Term			Spring Term		
BIO 1030	Nutrition	3	BIO 2012	Human Anatomy & Physiology II	4
BIO 2011	Human Anatomy & Physiology I	4	DHY 1012	Clinical Dental Hygiene I	5
DHY 1011	Pre-Clinical Dental Hygiene	5	DHY 1022	Oral Tissues II & Medical Emergencies	3
DHY 1021	Oral Tissues I	3	ENG 1061	English Composition	3
		15			**15**

Second Year

Fall Term			Spring Term		
BIO 2120	Elements of Microbiology	4	DHY 2010	Dental Materials	3
DHY 1030	Dental Radiology	3	DHY 2020	General Pathology & Pharmacology	3
DHY 2030	Periodontics	3	DHY 2722	Clinical Dental Hygiene III	4
DHY 2721	Clinical Dental Hygiene II	4	ENG 2080	Technical Communication	3
PSY 1010	Introduction to Psychology	3	MAT 1440	Mathematics for Health Sciences	3
		17			**16**

Third Year

Fall Term

CIS XXXX	CIS elective	3
DHY 2210	Community Oral Health I	2
DHY 3821	Clinical Dental Hygiene IV	6
HUM 2020	Bioethics	3
select one		
MAT 1221	Finite Mathematics	3
MAT 2021	Statistics	3
		17

Spring Term

CHE 1020	Introduction to Chemistry	4
DHY 2211	Community Oral Health II	1
DHY 2220	Oral Pathology	3
DHY 3822	Clinical Dental Hygiene V	6
		14

Fourth Year

Fall Term

DHY 3010	Evidence-Based Decision Making	3
DHY 3015	Contemporary Issues in DHY	3
DHY 4010	Advanced Community Oral Health	3
ELE XXXX	AH/SS elective	3
		12

Spring Term

DHY 3020	Advanced Periodontics	3
DHY 3030	DHY Methodology & Leadership	3
DHY 4213	Practice Management	3
DHY 4237	Introduction to DHY Research Methods	3
ELE XXXX	AH/SS elective	3
		15

All DHY and BIO course must be completed with a grade of C or better to continue in the program.

Dental Hygiene (+2 BS)

A student with a Bachelor of Science in Dental Hygiene will be able to:

1. Explore various occupational settings such as public health, education, sales, and research
2. Study further at the graduate level
3. Broaden their knowledge base and education experience in dental hygiene and general education courses
4. Demonstrate skills in critical thinking and evidence-based research
5. Demonstrate a commitment to lifelong learning

All courses are completed online, no campus visits are required, and the student has six years to complete the required courses for the bachelor's degree. The degree may be earned while the student is employed as a practitioner or working as a full-time student.

This program holds articulation agreements with Bristol Community College, Cape Cod Community College, Cuyahoga Community College, Middlesex Community College, Monroe Community College, Mount Wachusett Community College, New Hampshire Technical Institute, Quinsigamond Community College, Springfield Technical Community College, and Tunxis Community College associate degree dental hygiene programs. These agreements are designed to maximize the number of credits students can transfer to Vermont Tech.

The minimum number of credits required for the degree is 120.

Third Year

Fall Term

DHY 3010	Evidence-Based Decision Making	3
DHY 3015	Contemporary Issues in DHY	3
ELE XXXX	AH/SS elective	3
PSY 1050	Human Growth & Development	3
		12

Spring Term

CHE 1020	Introduction to Chemistry	4
CIS XXXX	CIS elective	3
DHY 3020	Advanced Periodontics	3
DHY 3030	DHY Methodology & Leadership	3
		13

Fourth Year

Fall Term

DHY 4010	Advanced Community Oral Health	3
ELE XXXX	AH/SS elective	3
select one		
HUM 2020	Bioethics	3
PHI 1040	Introduction to Ethics	3
select one		
MAT XXXX	Mathematics elective	3
CTE XXXX	Critical thinking elective	3
		12

Spring Term

DHY 4213	DHY Practice Management	3
DHY 4237	Introduction to DHY Research Methods	3
ELE XXXX	AH/SS elective	3
select one		
ELE XXXX	AH/SS elective	3
POS 1020	Introduction to American Politics & Govt	3
		12

All DHY and BIO courses must be completed with a grade of C or better to continue in the program.

Nursing (PN)

A student with a certificate in Practical Nursing will be able to:

1. Employ the nursing process for select clients to maintain, achieve, or regain optimal self-care
2. Integrate knowledge of scientific, behavioral, and cultural principles in the care of clients in a variety of settings
3. Establish collaborative relationships with members of the nursing and health team
4. Maintain confidentiality in a clinical setting and support the use of legal and ethical standards
5. Assume the role of a member of an interdisciplinary team
6. Provide care which maximizes the self-care potential of individuals across the lifespan in a variety of healthcare settings
7. Contribute to the development of a teaching plan for the client with an alteration in basic self-care needs
8. Assume responsibility for self-directed, goal-oriented growth

The PN program extends over three terms, August through June. The student learns PN skills through independent study, lectures, demonstrations, and practice in a nursing skills lab and provides patient care under instructor supervision in a variety of healthcare settings.

Upon completion of the program, the graduate is awarded a Certificate of Practical Nursing and may apply to take the NCLEX-PN licensure exam. It's the Vermont State Board of Nursing's responsibility to determine eligibility to sit for the licensure examination and to issue a license.

Students accepted into the Practical Nursing program must be 18 years of age by September 1 of the PN fall term.

PN students must receive a grade of *C+* (77) or better in all NUR courses and a *C* (75) or better in BIO and PSY courses in order to progress in the program. If a student in the last term of the program doesn't achieve these grades, they aren't allowed to graduate. Grades lower than the required 75 or 77 are reflected on the transcript with the corresponding letter grade, so credits may be awarded for any grade above an *F* (60), but the student won't progress or graduate from the program.

The minimum number of credits required for the certificate is 35.

First Year

Fall Term

BIO 1030	Nutrition*	3
BIO 2011	Human Anatomy & Physiology I*	4
NUR 0111	Principles& Practices of Nursing I Lab	4
NUR 1020	The Nurse-Client Relationship	3
NUR 1111	Principles & Practices of Nursing I	5
		19

Winter Term

BIO 2012	Human Anatomy & Physiology II*	4
NUR 0121	Principles & Practices of Nursing II Lab	4
NUR 1010	Pharmacology for Nursing	3
NUR 1121	Principles & Practices of Nursing II	5
PSY 1050	Human Growth & Development*	3
		19

Spring2 Term

NUR 0131	Principles & Practices of Nursing III	4
NUR 1131	Principles & Practices of Nursing III	5
		9

** Prerequisite courses required at all sites except Randolph and Williston.*

The certificate program includes 495 hours of theory and 630 hours of clinical/lab.
Only 35 credits from the PN program count toward cumulative credits. Only non-clinical hours/courses count toward GPA.

Nursing (ADN)

A student with an Associate of Science in Nursing will be able to:

1. Evaluate the plan of care to assist clients with complex healthcare needs to maintain, achieve, or regain their optimal level of self-care
2. Select appropriate scientific, behavioral, and cultural principles for the care of clients with complex needs in diverse settings
3. Evaluate interpersonal skills in professional practice
4. Incorporate behaviors consistent with legal and ethical standards of professional practice
5. Assume the role of manager of care within the interdisciplinary team
6. Competently deliver nursing care which maximizes the self-care potential of individuals with complex health needs in diverse settings
7. Evaluate a comprehensive teaching plan to meet the physical and emotional needs of individuals and groups with common and complex healthcare needs
8. Demonstrate accountability for growth as individuals, as members of society, and as professional nurses

The ADN program articulates with the PN program and requires two further terms of full-time study. The 12 clinical PN credits don't transfer to the ADN program.

Vermont Tech guarantees direct progression from PN to ADN for qualified students. Because of the competitive demand for seats and the limitations of clinical placements in some areas of the state, students may have to continue at a site other than their first choice and must request their first, second, and third site preferences on their Request for Nursing Direct Progression form. Priority goes to students who wish to remain at their PN site, in order of GPA. Once ADN seats are filled at a site, we place students at their next preferences as seats are available. A student whose first preference is an ADN site other than their PN site is considered for that site only after qualified PN students at that site have been offered a seat.

Graduates may apply to take the NCLEX-RN. It's the Vermont State Board of Nursing's responsibility to determine eligibility to sit for the licensure examination and to issue a license.

ADN students must receive a grade of *C+* (77) or better in all NUR courses and a *C* (75) or better in BIO and PSY courses in order to progress in the program. If a student in the last term of the program doesn't achieve these grades, they aren't allowed to graduate. Grades lower than the required 75 or 77 are reflected on the transcript with the corresponding letter grade, so credits may be awarded for any grade above an *F* (60), but the student won't progress or graduate from the program.

To progress directly from the ADN to the BSN level, a student must:

- Declare their intent to progress on a Change of Program form no later than March 31 of the year in which they wish to progress
- Maintain a minimum cumulative 2.5 GPA throughout the ADN program
- Obtain licensure as a Registered Nurse after completing the ADN degree

The minimum number of credits required for the degree is 70.

Second Year

Fall Term			Spring Term		
AHE XXXX	AH elective	3	ENG 2080	Technical Communication	3
BIO 2120	Elements of Microbiology	4	MAT 1440	Applied Mathematics for Health Sciences	3
ENG 1061	English Composition	3	NUR 2130	Principles & Practices of Nursing V	6
NUR 2010	LPN to RN Transition/Trends in Nursing	2	NUR 2140	Principles & Practices of Nursing V Lab	4
NUR 2030	Principles & Practices of Nursing IV	3	PSY 1010	Introduction to Psychology	3
NUR 2040	Principles & Practices of Nursing IV	2			
		17			**19**

The associate degree program includes 420 hours of theory and 315 hours of clinical/lab.
Only non-clinical hours/courses count toward GPA.

Nursing (BSN)

A student with a Bachelor of Science in Nursing will be able to:

1. Collaborate with patients, the interdisciplinary team, and multiple care providers when planning care to establish patient-centered goals to optimize wellness outcomes and evaluate care plan effectiveness for the individual, organization, and community
2. Engage applied sciences including scientific, behavioral, psychological, and cultural principles for the care of complex patients that incorporates global appreciation, understanding, and tolerance; design evidence-based practice to improve patient care and health
3. Determine utilization of collaborative relationships with the healthcare team and the community to facilitate communication of team members to enhance care, promote quality care, and strategize utilization of technology, embracing diversity while evolving therapeutic communication techniques of presencing and dialogical exchange
4. Integrate legal and ethical standards that address potential ethical dilemmas and promote self-integrity and consider benefits to the community's, state's, and nation's health
5. Coordinate and co-lead the interdisciplinary team; advocate for patients by compassionately caring for people and families using the art and science of nursing in theoretically and evidence-based practice
6. Help people flourish and find optimal meaning in their lived experiences, demonstrate sound nursing judgment, utilize critical thinking, develop scholarship, and promote the healthiest possible community, state, and nation
7. Design a holistic teaching plan or pamphlet with understanding of the person, health, environment, and nursing
8. Strive for excellence through ongoing engagement in self-directed lifelong learning with participation as an active member of society in their community; working with or becoming leaders; and developing their professional identity and ability to work with teams to create innovative or evidence-based solutions to problems

Students currently enrolled in the ADN program may continue directly in the BSN program if they maintain a minimum 2.5 GPA and obtain an encumbered Registered Nurse license prior to beginning NUR courses in the program.

A BSN student must receive a grade of *C* (75) or better in all NUR courses for the course to count toward the degree. If they don't, they are placed on academic probation but can continue to take classes. They may retake the course once within a one-year period and are removed from probation if they receive a *C* (75) or better in that course. Receiving a grade of *C*- (73) or less in the same course twice or once in two separate courses is grounds for dismissal from the program. The Associate Dean of Nursing reviews such cases for mitigating circumstances and makes final decisions regarding dismissal. Please see the Nursing Student Readmission Policy in the Nursing Student Handbook.

The minimum number of credits required for the degree is 121.

Third Year

Fall Term			Spring Term		
MAT 2021	Statistics	3	NUR 3210	Healthcare Systems*	3
NUR 3100	RN to BSN: Online Transition*	1	PSY 3070	Abnormal Psychology	3
NUR 3110	Nursing Informatics*	3	SOC XXXX	Sociology elective	3
NUR 3140	Pathophysiology & Assessment	4	**select one**		
select one			NUR 4011	Teaching/Learning in Healthcare*	3
NUR 3120	Palliative & End-of-Life Care*	3	NUR 4012	Health Promotion Across the Lifespan*	3
NUR 3121	Trans of Care in Healthcare Reform*	3			
		14			**12**

Fourth Year

Fall Term			Spring Term		
HUM 2020	Bioethics	3	HUM 4010	East & West Holistic Healing	3
NUR 4110	Research & Evidence-Based Practice	4	NUR 4210	Global Health & Population Healthcare*	3
NUR 4130	Nursing Leadership & Management	6	NUR 4410	Community Health	6
		13			**12**

The BSN program includes 675 hours of theory and 225 hours of precepted time that can be completed in the student's community or work setting.

Courses marked with an asterisk (*) are offered as half-term classes of 7.5 weeks each.

Paramedicine (C)

A student with a certificate in Paramedicine will be able to:

1. Demonstrate proper affective behaviors when interacting with patients, the public, and members of the health care team
2. Perform a comprehensive history and physical examination to identify factors affecting the health and health needs of a patient
3. Formulate a field impression based on analysis of comprehensive assessment findings, anatomy, physiology, pathophysiology, and epidemiology
4. Relate assessment findings to underlying pathological and physiological changes in the patient's condition
5. Integrate and synthesize the multiple determinants of health and clinical care
6. Perform health screenings and referrals
7. Effectively communicate in a manner that's culturally sensitive and intended to improve patient outcome
8. Safely and effectively perform all psychomotor skills within the National EMS Scope of Practice Model and state Scope of Practice at the Paramedic level
9. Anticipate and prospectively intervene to improve patient outcome
10. Act as a role model of exemplary professional behavior
11. Perform basic and advanced interventions as part of a treatment plan intended to mitigate an emergency, provide symptom relief, and improve the overall health of the patient
12. Evaluate the effectiveness of interventions and modify treatment plans accordingly
13. Report and document assessment findings and interventions
14. Collect and report data for epidemiological and research purposes
15. Perform a patient assessment, develop a treatment plan, and develop a disposition plan for a patient with a variety of medical and traumatic complaints
16. Function as the team leader of a routine, single-patient advanced life support emergency call
17. Ensure the safety of rescuers and others during an emergency
18. Assume responsibility for self-directed, goal-oriented growth

The minimum number of credits required for the certificate is 39.

First Year

Fall Term

BIO 2011	Human Anatomy & Physiology I	4
EMS 1020	The Art of Paramedicine	2
EMS 1030	Pharmacology & Med Administration	3
EMS 1040	Airway Management	1
EMS 1050	Paramedic Principles & Practices I	2
EMS 1801	Paramedic Field Experience I	1
		13

Spring Term

BIO 2012	Human Anatomy & Physiology II	4
EMS 1210	Medical Emergencies	4
EMS 1230	Cardiology	3
EMS 1240	Paramedic Principles & Practices II	2
EMS 1802	Paramedic Field Experience II	1
		14

Summer Term

EMS 1310	OB/GYN & Pediatrics	3
EMS 1320	Trauma Management	3
EMS 1330	EMS Operations	2
EMS 1340	Special Considerations	1
EMS 1350	Paramedic Principles & Practices III	2
EMS 1803	Paramedic Field Experience III	1
		12

Second Year

Fall Term

EMS 1804	Paramedic Field Internship	0

Radiologic Science (AS)

A student with an Associate of Science in Radiologic Science will be able to:

1. Use algorithmic reasoning when determining exposure factors to obtain diagnostic quality radiographs with minimum radiation exposure
2. Practice radiation protection for the patient, self, and others
3. Position the patient and imaging system to perform optimum radiographic examinations on patients throughout the lifespan
4. The successful student will use effective non-verbal, oral and written communication in patient care to anticipate and provide basic care and comfort, patient education as well as for professional relationships
5. Exercise critical thinking and discretion in the technical performance of medical imaging procedures consistent with current standards of practice
6. Support cultural and social awareness when providing medical imaging procedures
7. Appraise patient information from multiple sources to perform medical imaging procedures consistent with the scope of practice

Each student receives hands-on experience in medical imaging. Along with radiologic technology, the student participates in other areas of medical imaging, including computed tomography, magnetic resonance imaging, and mammography.

The program builds a strong framework for further study.

The minimum number of credits required for the degree is 77.

First Year

Fall Term

BIO 2011	Human Anatomy & Physiology I	4
PSY 1050	Human Growth & Development	3
RAD 1011	Radiologic Clinical Education I	4
RAD 1210	Radiologic Science I	3
RAD 1310	Radiographic Procedures I	4
		18

Spring Term

BIO 2012	Human Anatomy & Physiology II	4
ENG 1061	English Composition	3
RAD 1012	Radiologic Clinical Education II	4
RAD 1211	Radiologic Science II	3
RAD 1311	Radiographic Procedures II	4
		18

Summer Term Part One

RAD 1110	Summer RAD Clinical Education I	4

Summer Term Part Two

RAD 1111	Summer RAD Clinical Education II	4

Second Year

Fall Term

MAT 1440	Mathematics for Health Sciences	3
PSY 1010	Introduction to Psychology	3
RAD 2113	Radiologic Clinical Education III	4
RAD 2230	Radiographic Pathology	3
RAD 2312	Radiographic Procedures III	4
		17

Spring Term

ELE XXXX	AH/SS elective	3
ENG 2080	Technical Communication	3
RAD 2114	Radiologic Clinical Education IV	4
RAD 2210	Radiologic Science Review Seminar	1
RAD 2220	Radiation Biology	3
RAD 2240	Specialized Imaging	2
		16

All BIO and RAD courses must be completed with a grade of C or better to continue in the program.

Respiratory Therapy (AS)

A student with an Associate of Science in Respiratory Therapy will be able to:

1. Collect, review, and evaluate clinical data to determine the appropriateness of the prescribed respiratory care plan and participate in its development
2. Initiate, conduct, and modify prescribed therapeutic procedures to achieve the desired objectives
3. Assemble, check function, correct malfunctions, and perform quality control of respiratory therapy equipment
4. Acquire knowledge by questioning, analyzing, evaluating, and synthesizing information
5. Use numbers and formulate relationships between them to analyze, interpret, and develop appropriate strategies for respiratory care
6. Work together with other professionals on the health care team in a manner that fosters mutual respect and facilitates the effective handling of patient care issues
7. Completely document patient care sessions in the medical record in a concise and legible manner following a problem-oriented format and using the SOAP or other generally accepted notation
8. Write clear, coherent, and comprehensive laboratory and clinical case reports
9. Communicate with clients, family members of clients, and members of the healthcare team using appropriate verbal and nonverbal skills
10. Inform the practice of respiratory care by actively seeking new knowledge from colleagues, clients, the community, and related educational research
11. Expand the role of the respiratory therapist as an essential member of the healthcare team
12. Practice respiratory care effectively in a variety of cultural contexts
13. Be aware of the ethical dimension of healthcare and strive to understand and maintain the highest personal and professional standards

Graduates are eligible to attempt the credential examinations offered by the National Board for Respiratory Care. Upon successful completion of the credential exams, graduates receive the Registered Respiratory Therapist credential.

Credentialed respiratory therapists must apply for licensure to practice in Vermont and New Hampshire. The offices of professional regulation require information regarding past history of substance abuse, prior felony convictions, and failure to pay child support or taxes to determine eligibility. Other states requiring licensure for practice may ask similar questions. For more information, please refer to the Vermont Secretary of State or the New Hampshire Office of Professional Licensure and Certification.

The minimum number of credits required for the degree is 67.

First Year

Fall Term

ENG 1061	English Composition	3
RSP 1010	Foundations of Respiratory Care	3
RSP 1011	Respiratory Care I	5
RSP 1013	Respiratory Care Pharmacology	3
select one		
MAT 1210	Principles of Mathematics	3
MAT 1221	Finite Mathematics	3
MAT 2021	Statistics	3
		17

Spring Term

ELE XXXX	AH/SS elective	3
PSY 1050	Human Growth & Development	3
RSP 1012	Respiratory Care II	5
RSP 1210	Respiratory Anatomy & Physiology	3
RSP 1601	Respiratory Clinical Field Experience I	2
		16

Summer Term

RSP 2801	Respiratory Internship	0

Second Year

Fall Term

BIO 2120	Elements of Microbiology	4
RSP 2011	Cardiopulmonary Disease I	4
RSP 2013	Respiratory Care III	5
RSP 2602	Respiratory Clinical Field Experience II	4
		17

Spring Term

ELE XXXX	AH/SS elective	3
ENG 2080	Technical Communication	3
RSP 2012	Cardiopulmonary Disease II	4
RSP 2603	Respiratory Clinical Field Experience III	6
RSP 2802	Respiratory Internship Review	1
		17

All BIO and RSP courses must be completed with a grade of C or better to continue in the program.

School of Professional Studies & Management

Minors, Concentrations, & Specializations

The Business Technology & Management department offers a minor or concentration in Entrepreneurship and a specialization in Small Business Planning.

A minor is a secondary area of interest that often complements a major or it may be a completely different area of study which serves to balance the student's educational experience and life preparation. A student who satisfies the minor requirements for their area of major study may earn a concentration. Although not a degree requirement of the college, minors and concentrations allow students to group related courses into an organized field of study. Minors require a minimum of 18 credits of related study and a minimum GPA of 2.0 for those credits.

There are no limits to the number of minors that a student may earn. Students apply for a minor in their junior year or by permission of the host department. Students may take courses related to the minor prior to their junior year provided they meet the course requirements. Applying for a minor requires completion of a Declaration of Intention to Complete a VTC Minor form and good academic standing. Graduates of Vermont Tech with a bachelor's degree may not earn a minor.

Entrepreneurship Minor

In this minor for non-Business bachelor's degree majors, students must take the following courses. No more than 9 credits of the minor may be applied to the major degree requirements.

BUS 2041	Foundations of Entrepreneurship	3
BUS 2210	Small Business Management	3
BUS 3041	Applied Entrepreneurship	3
BUS 3230	Principles of Financial Management	3
BUS 3721	Business Planning Seminar	3
select one		
ACC 1020	Survey of Accounting	3
ACC 2121	Financial Accounting	4
		18-19

Entrepreneurship Concentration

In this concentration for Business bachelor's degree majors, students must take the courses in the previous table. No more than 9 credits of the minor may be applied to the major degree requirements.

Small Business Planning Specialization

In this specialization (open to all students including non-degree), students must take the following courses. All credits may be applied toward graduation requirements.

BUS 2210	Small Business Management	3
BUS 3230	Principles of Financial Management	3
BUS 3721	Business Planning Seminar	3
select one		
ACC 1020	Survey of Accounting	3
ACC 2121	Financial Accounting	4
		12-13

Applied Business Management (+2 BS)

Applied Business Management is a degree-completion program that's offered entirely online. Students must have at least 50 transferable credits from an accredited institution. All coursework from an accredited institution not used to meet core requirements may be used toward the 120-credit minimum provided that it does not duplicate other coursework.

A student with a Bachelor of Science in Applied Business Management will be able to:

1. Determine the key characteristics and terminology of the business disciplines of management, human resources, marketing, innovation, and finance and integrate these disciplines to develop and affect corporate strategies and plans
2. Communicate with written, oral, visual, and interpersonal messages to convey information, promote ideas, provide customer service, and advance career goals
3. Explain the accounting cycle; process typical transactions; interpret financial statements; prepare budgets; forecast and evaluate risk; and apply financial information to broad-based business decision making
4. Lead and participate in teams, maintain respectful and collaborative relationships, and contribute to effective group outcomes
5. Use digital and analytical tools to design and create business documents and presentations to manage people and projects and to solve problems
6. Develop marketing strategies to satisfy specific target audiences, create a marketing mix, and apply and integrate marketing concepts with other business disciplines to affect a business strategy
7. Demonstrate qualitative and quantitative critical thinking skills to analyze current business situations and new ventures from legal, economic, social, and ethical perspectives and recommend appropriate actions
8. Recommend and justify best practices in management, motivation, and leadership concepts to create and sustain a positive organizational culture in a global and diverse environment

Minimum degree requirements are listed here. A typical curriculum is shown below.

The minimum number of credits required for the degree is 120.

Third Year

Fall Term			Spring Term		
ACC 2121	Financial Accounting	4	BUS 2230	Principles of Marketing	3
BUS 2020	Principles of Management	3	BUS 3250	Organizational Behavior & Management	3
BUS 2440	Introduction to Business Law	3	ENG 2080	Technical Communication	3
CIS 1041	Computer Applications	3	MAT 2021	Statistics	3
MAT 1210	Principles of Mathematics	3	SCI XXXX	Science elective	4
		16			**16**

Fourth Year

Fall Term			Spring Term		
BUS 3230	Principles of Financial Management	3	BUS 4080	Business Policy & Strategy Development	3
ECO 2060	Survey of Economics	4	**as required**		
ELE 3XXX	Upper-level AH/SS elective	3	BUS 4310	Writing for Workplace Success	3
as required			BUS 4530	Technical Project Management	3
BUS 3150	Production & Operations Management	3	ELE XXXX	AH/SS elective	3
BUS 3410	Business Ethics	3	SCI XXXX	Science elective	4
			XXX XXXX	Elective	3
		13-16			**12-19**

Automotive Technology (AAS)

A student with an Associate of Applied Science in Automotive Technology will be able to:

1. Understand the theory of operation, plus diagnostic service procedures, for gasoline engines light-duty hydraulic brake systems; passenger car and light truck suspension and steering systems; automotive electrical and electronic systems; passenger car and light truck drive train systems; automotive engine performance; advanced technology automotive vehicles; passenger car and light truck transmissions; and automotive heating and air-conditioning systems
2. Communicate effectively with automotive customers and business relations
3. Exhibit the principles of professional conduct in all aspects of customer relations

The student must possess a set of hand tools for use in the lab and for the summer internship program. A tool list is available from the department. The student should also have a dependable vehicle to travel to and from the lab facilities. Students are required to wear black work pants and steel-toed leather work or hiking boots in all lab sections. The college provides t-shirts.

The minimum number of credits required for the degree is 65.

First Year

Fall Term			Spring Term		
ATT 1011	Suspension & Steering I	1.5	ATT 1020	Engine Diagnostics & Repair	4
ATT 1012	Suspension & Steering II	1.5	ATT 1051	Alignment & Brakes I	2
ATT 1013	Preventative Maintenance	2	ATT 1052	Alignment & Brakes II	2
ATT 1090	Automotive Electronics Lab	1	ATT 1110	Automotive Electrical Systems Lab	1
ELE XXXX	AH/SS elective	3	CIS 1050	Introduction to Spreadsheets	1
ENG 1061	English Composition	3	GTS 1040	Vehicle Electrical Systems	3
GTS 1120	Vehicle Electronics	3	PHY 1030	General Physics	4
MAT 1210	Principles of Mathematics	3			
		18			**17**

Second Year

Fall Term			Spring Term		
ATT 2010	Engine Performance	4	ATT 2030	Advanced Engine Performance & Fuel	4
ATT 2020	Body Electronics Systems	4	ATT 2040	Automotive Drive Trains	4
ATT 2802	ATT Summer Internship Review	1	ATT 2060	Advanced Technology Vehicle	4
ELE XXXX	AH/SS elective	3	ENG 2080	Technical Communication	3
select one					
BUS 2210	Small Business Management	3			
XXX XXXX	Elective	3			
		15			**15**

Business Technology & Management (AAS)

A student with an Associate of Applied Science in Business Technology & Management will be able to:

1. Identify the key characteristics and terminology of the business disciplines of management, human resources, marketing, innovation, and finance
2. Communicate with written, oral, visual, and interpersonal messages to convey information, promote ideas, provide customer service, and advance career goals
3. Complete the steps of the accounting cycle to process typical business transactions; prepare and interpret financial statements; and use integrated accounting software to record finances for a small business
4. Participate in teams; maintain respectful and collaborative relationships; and contribute to effective group outcomes
5. Use Microsoft Office and Adobe Creative Suite software to design and create business documents
6. Develop marketing strategies to satisfy specific target audiences and create a marketing mix that will generate a competitive advantage

Minimum degree requirements are listed here. A typical curriculum is shown below.

The minimum number of credits required for the degree is 62.

First Year

Fall Term

ACC 2121	Financial Accounting	4
BUS 1341	Exploring Business & Entrepreneurship	3
CIS 1041	Computer Applications	3
ENG 1061	English Composition	3
MAT 1210	Principles of Mathematics	3
		16

Spring Term

ACC 1010	Computerized Accounting	3
CIS 1042	Computer Applications II	3
ENG 2080	Technical Communication	3
INT 1005	Self, Career, & Culture	3
select one		
BUS 2210	Small Business Management	3
BUS 2410	Human Resource Management	3
BUS 2440	Introduction to Business Law	3
CIS 1151	Website Development	3
XXX XXXX	Elective	3
		15-16

Second Year

Fall Term

BUS 2020	Principles of Management	3
BUS 2270	Interpersonal & Oral Communication	3
ELE XXXX	AH/SS elective	3
as required		
BUS 2041	Foundations of Entrepreneurship	3
BUS 2210	Small Business Management	3
BUS 2440	Introduction to Business Law	3
BUS 3230	Principles of Financial Management	3
CIS 1151	Website Development	3
SCI XXXX	Science elective	4
XXX XXXX	Elective	3
		12-19

Spring Term

BUS 2230	Principles of Marketing	3
BUS 3811	Business Problem Practicum	3
as required		
BUS 2210	Small Business Management	3
BUS 2350	Effective Leadership	3
BUS 2440	Introduction to Business Law	3
CIS 1151	Website Development	3
SCI XXXX	Science elective	4
XXX XXXX	Elective	3
		12-19

Business Technology & Management (BS)

A student with a Bachelor of Science in Business Technology & Management will be able to:

1. Determine the key characteristics and terminology of the business disciplines of management, human resources, marketing, innovation, and finance and integrate these disciplines to develop and affect corporate strategies and plans
2. Communicate with written, oral, visual, and interpersonal messages to convey information, promote ideas, provide customer service, and advance career goals
3. Explain the accounting cycle, process typical transactions; interpret financial statements;prepare budgets; forecast and evaluate risk; and apply financial information to broad-based business decision making
4. Lead and participate in teams; maintain respectful and collaborative relationships; and contribute to effective group outcomes
5. Use digital and analytical tools to design and create business documents and presentations to manage people and projects and to solve problems
6. Develop marketing strategies to satisfy specific target audiences, create a marketing mix, and apply and integrate marketing concepts with other business disciplines to affect a business strategy
7. Demonstrate qualitative and quantitative critical thinking skills to analyze current business situations and new ventures from legal, economical, social, and ethical perspectives and recommend appropriate actions
8. Recommend and justify best practices in management, motivation, and leadership concepts to create and sustain a positive organizational culture in a global and diverse environment

Minimum degree requirements are listed here. A typical curriculum is shown below.

The minimum number of credits required for the degree is 120.

Third Year

Fall Term			**Spring Term**		
BUS 2440	Introduction to Business Law	3	BUS 3250	Organizational Behavior & Management	3
BUS 3230	Principles of Financial Management	3	ELE XXXX	AH/SS elective	3
ECO 2060	Survey of Economics	4	MAT 2021	Statistics	3
SCI XXXX	Science elective	3-4	**as required**		
			XXX XXXX	Elective	3
		13-14			**12-15**

Fourth Year

Fall Term			**Spring Term**		
ELE XXXX	AH/SS elective	3	BUS 3811	Business Problem Practicum	3
as required			BUS 4080	Business Policy & Strategy Development	3
BUS 3150	Production & Operations Management	3	**as required**		
BUS 3410	Business Ethics	3	BUS 4310	Writing for Workplace Success	3
XXX XXXX	Elective	3	BUS 4530	Technical Project Management	3
			ELE XXXX	AH/SS elective	3
			XXX XXXX	Elective	3
		12			**12-18**

Business Technology & Management (+2 BS)

The +2 Business Technology & Management program is a degree-completion program. Students must have at least 50 transferable credits from an accredited institution. All coursework from an accredited institution not used to meet core requirements may be used toward the 120-credit minimum provided it does not duplicate other coursework.

Student outcomes correlate with the four-year bachelor's degree.

Minimum degree requirements are listed here. A typical curriculum is shown below.

The minimum number of credits required for the degree is 120.

Third Year

Fall Term			Spring Term		
ACC 2121	Financial Accounting	4	BUS 2230	Principles of Marketing	3
BUS 2020	Principles of Management	3	ENG 2080	Technical Communication	3
CIS 1041	Computer Applications	3	ELE XXXX	AH/SS elective	3
ECO 2060	Survey of Economics	4	MAT 2021	Statistics	3
MAT 1210	Principles of Mathematics	3	SCI XXXX	Science elective	3-4
		17			**15-16**

Fourth Year

Fall Term			Spring Term		
BUS 2440	Introduction to Business Law	3	BUS 3250	Organizational Behavior & Management	3
BUS 3230	Principles of Financial Management	3	BUS 3811	Business Problem Practicum	3
as required			BUS 4080	Business Policy & Strategy Development	3
BUS 3150	Production & Operations Management	3	**as required**		
BUS 3410	Business Ethics	3	BUS 4310	Writing for Workplace Success	3
XXX XXXX	Elective	3	BUS 4530	Technical Project Management	3
			ELE XXXX	AH/SS elective	3
		12-15			**12-18**

Construction Management (AAS)

A student with an Associate of Applied Science in Construction Management will be able to:

1. Communicate construction materials and methods using graphical symbols, drafting practice, and computer-aided design
2. Create and oral communications appropriate to the discipline
3. Use computers for computation, research, documentation, and communication
4. Identify building components and materials
5. Demonstrate and model industry-accepted (OSHA) safety practices
6. Understand a load table and choose proper materials for structural members
7. Create and administer construction schedules
8. Apply basic surveying techniques for construction layout and control
9. Create written communications appropriate to the discipline
10. Complete construction project cost estimates

Due to emphasis on mobility, cooperative projects, and paperless construction management in the program, we recommend a laptop. Electronic textbooks are used frequently. PC software, including Microsoft Office, Bluebeam, and CAD, is available to students at little to no cost A student in this program will need basic construction hand tools such as a tape measure and tool belt.

The minimum number of credits required for the degree is 66.

First Year

Fall Term			Spring Term		
CPM 1000	CPM Freshman Seminar	1	CPM 1010	Electrical/Mechanical Systems	3
CPM 1021	Construction Graphics I	2	CPM 1022	Construction Graphics II	2
CPM 1031	Residential Construction Systems	3	CPM 1111	Commercial Construction Systems	4
CPM 1032	Construction Lab	2	PHY 1030	General Physics	4
ELE XXXX	AH/SS elective	3			
ENG 1061	English Composition	3			
MAT 1311	Precalculus I	3			
		17			**13**

Second Year

Fall Term			Spring Term		
ACC 1020	Survey of Accounting	3	BUS 2210	Small Business Management	3
BUS 2440	Introduction to Business Law	3	CPM 2030	Elementary Theory of Structures	4
CPM 2010	Construction Estimates I	3	CPM 2730	Construction Seminar & Project	3
CPM 2020	Construction Project Management	3	ELE XXXX	AH/SS elective	3
CPM 2050	Construction Management Software	1	ENG 2080	Technical Communication	3
CPM 2060	Field Engineering	3			
CPM 2802	Construction Internship Review	1			
		17			**16**

Construction Management (BS)

In addition to the student outcomes included in the associate program, a student with a Bachelor of Science in Construction Management will be able to:

1. Demonstrate strong technical and problem-solving backgrounds for management positions
2. Control or contribute to a profitable construction-related business
3. Adapt to technological and process changes in a rapidly developing field
4. Exhibit resiliency, lifelong learning, and a “no excuses” mentality
5. Create and implement a company safety plan
6. Create, estimate, condense, and graphically communicate Gantt, network diagram, and activity on node project management charts
7. Estimate and submit competitive construction bids
8. Manage a construction project, including materials and resources, from design phase to close out
9. Interpret construction drawings, specifications, and permits for implementation of best management practices
10. Properly lay out and site buildings, bridges, and roads from designs
11. Manage documentation for payments, inspections, as-built drawings, and progress submittals
12. Provide immediate first aid and life-saving care to other employees
13. Evaluate multiple choices in the means and methods of construction for fiscal decision-making and planning

The minimum number of credits required for the degree is 123.

Third Year

Fall Term

CORE CURRICULUM

CPM 4030	Construction Safety & Risk Management	3

CONSTRUCTION MANAGEMENT TRACK

CPM 3130	Construction Soils	3
ELE XXXX	AH/SS elective	3
select one		
MAT 1312	Precalculus II	3
MAT 2021	Statistics	3

CIVIL OR ARCHITECTURAL ENGINEERING TRACK

ACC 2121	Financial Accounting	3
BUS 2210	Small Business Management	3
BUS 2440	Introduction to Business Law	3
CPM 2010	Construction Estimates I	3
CPM 2020	Construction Project Management	3
		12-18

Spring Term

CORE CURRICULUM

BUS 2410	Human Resource Management	3
CPM 3010	Construction Estimates II	3
CPM 3020	Construction Documents	3
CPM 3030	Concrete & Steel Lab	2

CONSTRUCTION MANAGEMENT TRACK

select one		
CHE 1020	Introduction to Chemistry	4
PHY 1041	Physics I	4

CIVIL OR ARCHITECTURAL ENGINEERING TRACK

ELE XXXX	AH/SS elective	3
		14-15

Fourth Year

Fall Term

AHS 2035	First Aid & CPR	2
BUS 3230	Principles of Financial Management	3
CPM 4010	Contract Negotiations	3
CPM 4040	Construction Scheduling	3
ELE XXXX	AH/SS elective	3
as required		
CPM 4802	CPM Senior Internship Review	1
		14-15

Spring Term

BUS 2230	Principles of Marketing	3
CPM 4120	Project Planning & Finance	3
CPM 4130	Construction Superintendency	3
CPM 4140	Construction Contracts	3
		12

Diesel Power Technology (AAS)

A student with an Associate of Applied Science in Diesel Power Technology will be able to:

1. Understand the theory of operation, plus diagnostic service procedures, for diesel engines heavy-duty hydraulic and air brake systems; heavy-duty suspension and steering systems; heavy-duty electrical and electronic systems; heavy-duty drive train systems; advanced technology vehicles and equipment; heavy-duty transmissions; and heavy-duty heating and air-conditioning systems
2. Communicate effectively with customers and business relations
3. Exhibit the principles of professional conduct in all aspects of customer relations

The student must possess a set of hand tools for use in the lab and for the summer internship program. A tool list is available from the department. The student should also have a dependable vehicle to travel to and from the lab facilities. Students are required to wear black work pants and steel-toed leather work or hiking boots in all lab sections. The college provides t-shirts.

The minimum number of credits required for the degree is 62.

First Year

Fall Term			Spring Term		
DSL 1010	Steering, Suspension, & Alignment	3	DSL 1020	Diesel Power Systems	4
DSL 1030	Diesel Electronics Lab	1	DSL 1070	Diesel Electrical Systems Lab	1
DSL 1050	Preventive Maintenance	3	DSL 1110	Heavy Duty Braking Systems	3
ENG 1061	English	3	ELE XXXX	AH/SS elective	3
GTS 1120	Vehicle Electronics	3	GTS 1040	Vehicle Electrical Systems	3
MAT 1210	Principles of Mathematics	3	PHY 1030	General Physics	4
		16			**18**

Second Year

Fall Term			Spring Term		
DSL 2010	Fuel Systems	4	CIS 1050	Introduction to Spreadsheets	1
DSL 2030	Hydraulics	3	DSL 2020	Chassis Electrical/Electronic Sys	4
DSL 2802	DPT Summer Internship Review	1	DSL 2040	Power Transmission	3
ELE XXXX	AH/SS elective	3	**select one**		
ENG 2080	Technical Communication	3	ATT 2060	Advanced Technology Vehicle	4
select one			MEC 1020	Manufacturing Processes I	2
BUS 2210	Small Business Management	3			
XXX XXXX	Elective	3			
		17			**12**

Diesel Technology (C)

This certificate program allows the student to begin a successful career in the heavy-duty diesel service industry without taking additional math, science, English, and general education courses.

Upon completion of the certificate program, the student can achieve an Associate of Applied Science in Diesel Power Technology with one additional year of study.

The student pursuing the certificate should be cautioned that most upscale original equipment manufacturer's dealerships (Milton CAT, NORTRAX, etc.) require a minimum of an associate degree before they hire graduates.

The minimum number of credits required for the certificate is 28.

First Year

Fall Term

DSL 1010	Steering, Suspension, & Alignment	3
DSL 1030	Diesel Electronics Lab	1
DSL 1050	Preventive Maintenance	3
DSL 2010	Fuel Systems	4
DSL 2030	Hydraulics	3
GTS 1120	Vehicle Electronics	3
		17

Spring Term

DSL 1020	Diesel Power Systems	4
DSL 1070	Diesel Electrical Systems Lab	1
DSL 1110	Heavy Duty Braking Systems	3
GTS 1040	Vehicle Electrical Systems	3
		11

Entrepreneurship (AAS)

A student with an Associate of Applied Science in Entrepreneurship will be able to:

1. Identify the key characteristics and terminology of the business disciplines of management, human resources, marketing, innovation, and finance
2. Communicate with written, oral, visual, and interpersonal messages to convey information, promote ideas, provide customer service, and advance career goals
3. Complete the steps of the accounting cycle to process typical business transactions; prepare and interpret financial statements; and use integrated accounting software to record finances for a small business
4. Participate in teams; maintain respectful and collaborative relationships; and contribute to effective group outcomes
5. Use Microsoft Office and Adobe Creative Suite software to design and create business documents
6. Develop marketing strategies to satisfy specific target audiences and create a marketing mix that will generate a competitive advantage
7. Explain and apply an entrepreneurial mindset to processes of innovation
8. Integrate entrepreneurship concepts and skills to develop a feasibility plan

Minimum degree requirements are listed here. A typical curriculum is shown below.

The minimum number of credits required for the degree is 61.

First Year

Fall Term			Spring Term		
ACC 1020	Survey of Accounting	3	ACC 1010	Computerized Accounting	3
BUS 1341	Exploring Business & Entrepreneurship	3	BUS 2210	Small Business Management	3
CIS 1041	Computer Applications	3	ENG 2080	Technical Communication	3
ENG 1061	English Composition	3	INT 1005	Self, Career, & Culture	3
INT 1021	Creativity & Innovation	3	MAT 1210	Principles of Mathematics	3
		15			**15**

Second Year

Fall Term			Spring Term		
BUS 2020	Principles of Management	3	BUS 2230	Principles of Marketing	3
BUS 2041	Foundations of Entrepreneurship	3	BUS 3041	Applied Entrepreneurship	3
BUS 2270	Interpersonal & Oral Communication	3	BUS 3721	Business Planning Seminar	3
BUS 3230	Principles of Financial Management	3	SCI XXXX	Science elective	4
ELE XXXX	AH/SS elective	3	XXX XXXX	Elective	3
		15			**16**

Entrepreneurship (BS)

A student with a Bachelor of Science in Entrepreneurship will be able to:

1. Determine the key characteristics and terminology of the business disciplines of management, human resources, marketing, innovation, and finance and integrate these disciplines to develop and affect corporate strategies and plans
2. Explain the accounting cycle, process typical transactions; interpret financial statements; prepare budgets; forecast and evaluate risk; and apply financial information to broad-based business decision making
3. Lead and participate in teams; maintain respectful and collaborative relationships; and contribute to effective group outcomes
4. Use digital and analytical tools to design and create business documents and presentations to manage people and projects and to solve problems
5. Develop marketing strategies to satisfy specific target audiences, create a marketing mix, and apply and integrate marketing concepts with other business disciplines to affect a business strategy
6. Demonstrate qualitative and quantitative critical thinking skills to analyze current business situations and new ventures from legal, economical, social, and ethical perspectives and recommend appropriate actions
7. Recommend and justify best practices in management, motivation, and leadership concepts to create and sustain a positive organizational culture in a global and diverse environment
8. Develop detailed components of a comprehensive business plan in support of a new venture launch
9. Participate in or assess an entrepreneurial venture

Minimum degree requirements are listed here. A typical curriculum is shown below.

The minimum number of credits required for the degree is 120.

Third Year

Fall Term			**Spring Term**		
BUS 2440	Introduction to Business Law	3	BUS 3250	Organizational Behavior & Management	3
BUS 3230	Principles of Financial Management	3	ELE XXXX	AH/SS elective	3
ECO 2060	Survey of Economics	4	MAT 2021	Statistics	3
SCI XXXX	Science elective	3-4	**select two**		
			XXX XXXX	Elective	3
		13-14			**15**

Fourth Year

Fall Term			**Spring Term**		
ELE XXXX	AH/SS elective	3	BUS 4080	Business Policy & Strategy Development	3
as required			ELE XXXX	AH/SS elective	3
BUS 3150	Productions & Operations Management	3	**as required**		
BUS 3410	Business Ethics	3	BUS 4310	Writing for Workplace Success	3
XXX XXXX	Elective	3	BUS 4530	Technical Project Management	3
			XXX XXXX	Elective	3
		12			**12-15**

Entrepreneurship (+2 BS)

The +2 Entrepreneurship program is a degree-completion program. Students must have at least 50 transferable credits from an accredited institution. All coursework from an accredited institution not used to meet core requirements may be used towards the 120-credit minimum provided that it doesn't duplicate other coursework.

Student outcomes correlate with the four-year bachelor's degree.

Minimum degree requirements are listed here. A typical curriculum is shown below.

The minimum number of credits required for the degree is 120.

Third Year

Fall Term			Spring Term		
ACC 1020	Survey of Accounting	3	ACC 1010	Computerized Accounting	3
BUS 2020	Principles of Management	3	BUS 2440	Introduction to Business Law	3
BUS 2041	Foundations of Entrepreneurship	3	BUS 3041	Applied Entrepreneurship	3
CIS 1041	Computer Applications	3	BUS 3250	Organizational Behavior & Management	3
ECO 2060	Survey of Economics	4	ENG 2080	Technical Communication	3
MAT 1210	Principles of Mathematics	3	MAT 2021	Statistics	3
		19			**18**

Fourth Year

Fall Term			Spring Term		
BUS 2210	Small Business Management	3	BUS 2230	Principles of Marketing	3
BUS 2270	Interpersonal & Oral Communication	3	BUS 3721	Business Planning Seminar	3
BUS 3150	Production & Operations Management	3	BUS 4080	Business Policy & Strategy Development	3
BUS 3230	Principles of Financial Management	3	BUS 4530	Technical Project Management	3
ELE XXXX	AH/SS elective	3	ELE XXXX	AH/SS elective	3
SCI XXXX	Science elective	3-4			
		18-19			**15**

Professional Pilot Technology (BS)

A student with a Bachelor of Science in Professional Pilot Technology will be able to:

1. Demonstrate the knowledge and flight skills necessary to attain FAA pilot certificates and ratings
2. Use critical-thinking and decision-making skills to accurately assess situations and manage risk
3. Communicate and work effectively as a leader and in multidisciplinary teams
4. Understand the historic aspects and current developments defining the state and evolution of modern aviation
5. Engage in professional development and recognize the need for life-long learning
6. Analyze and interpret data using aeronautical, mathematical, and scientific principles

Educational objectives that are demonstrated during their workforce careers include:

- Achieving success in the dynamic and growing aviation industry with proper academic and professional certification
- Demonstrating knowledge of contemporary world-wide aviation industry issues
- Utilizing specific flying skills to attain FAA certificates and ratings that allow for employment as pilots and flight crew within the international aviation industry
- Mastering critical thinking and decision-making skills necessary for safe and effective flying
- Committing to lifelong learning with focus on continuous development of professional skills

Completion of the degree entails intensive motivation and commitment. Pilot certificates or ratings must be completed in their assigned term. This may require flying 4-5 times each week. The Chief Flight Instructor and their assistants are required to follow the published milestones and stage checks for every student to ensure proper completion. The student must make up cancellations or delays on weekends and during scheduled breaks if necessary and must be available to fly seven days per week, including some night flights.

Success in the program requires understanding that consequences incur for noncompliance of scheduling requests, failure to meet milestones, and stage check failures. If continuous interventions are necessary, the student can expect grade reductions or dismissal from the program. Compliance with all schedules, FAA regulations, and course syllabi are a major part of the training for a career in aviation. Students are expected to dress professionally and in accordance with the season at all times.

The minimum number of credits required for the degree is 121.

First Year

Fall Term

AER 1005	Introduction to Aviation Careers	3
AER 1010	Private Pilot: Ground	3
AER 1021	Private Pilot: Flight I	1
ATM 1031	Meteorology I	3
CIS 1041	Computer Applications	3
ENG 1061	English Composition	3
		16

Spring Term

AER 1022	Private Pilot: Flight II	1
ATM 1032	Aviation Meteorology II	4
ELE XXXX	AH/SS elective	3
INT 1005	Self, Career, & Culture	3
MAT 1311	Precalculus I	3
		14

Second Year

Fall Term

AER 1110	Pilot Instrument Rating: Ground	3
AER 1120	Pilot Instrument Rating: Flight	2
AER 2110	Aviation Safety & Accident Investigation	3
BUS 2020	Principles of Management	3
PHY 1041	Physics I	4
		15

Spring Term

AER 1053	Aerodynamics & Practical Flight Apps	4
AER 2010	Commercial Pilot: Ground	3
AER 2031	Commercial Pilot: Flight I	2
AER 2130	Aviation History	3
AER 2330	Aviation Physiology & Psychology	3
ENG 2080	Technical Communication	3
		18

Summer Term

AER 2032	Commercial Pilot: Flight II	2

Third Year

Fall Term

AER 3010	Certified Flight Instructor: Ground	6
AER 3030	Human Factors, Risk Management, CRM	3
AER 3040	Aircraft Maintenance for Pilots	3
AER 3080	Airline Operations & Management	3
optional		
AER 3020	Certified Flight Instructor: Flight	2
		15-17

Spring Term

AER 3110	Aviation Law	3
BUS 3250	Organizational Behavior & Management	3
ELE XXXX	AH/SS elective	3
MAT 2021	Statistics	3
select 3 credits		
AER 2802	Aviation Fieldwork/Internship	3
AER 4010	Multi-Engine Land: Ground & Flight	1
AER 4020	CFI: Instrument Ground & Flight	1
AER 4030	CFI: Multi-Engine Ground & Flight	1
ELE XXXX	AH/SS elective	3
		15

Fourth Year

Fall Term

AER 4040	Corporate Aviation & Career Preparation	3
AER 4060	Introduction to Unmanned Aerial Systems	3
AER 4610	Aviation Senior Project II	3
select two		
ELE XXXX	AH/SS elective	3
		15

Spring Term

AER 4050	Training & Flying Advanced Airplanes	3
AER 4110	Advanced Transport Category Systems	3
AER 4130	High-Altitude Navigation/Intl Flight Ops	3
ELE XXXX	AH/SS elective	3
		12

Course Descriptions

Accounting (ACC)

***ACC 1010 Computerized Accounting* (3)** **spring**
This course demonstrates implementation and integration of various accounting systems on a microcomputer. The student becomes proficient with applications in general ledger, receivables, payables, inventory, fixed assets, and the preparation of financial statements.
1 hour of lecture, 2 hours of lab per week Prerequisite: ACC 1020 or 2121

ACC 1020 Survey of Accounting (3) **as required**
In this course, the student identifies accounts and processes and records typical cash receipts, cash payments, and payroll transactions for a service business and a merchandising business. The student completes a worksheet; prepares and interprets financial statements; prepares adjusting and closing entries; and understands inventory valuation and depreciation of plant assets. This class is for non-Business majors.
3 hours of lecture per week

***ACC 2121 Financial Accounting* (4)** **fall**
This course covers the basics of generally accepted accounting principles, terminology, and the accounting cycle. The students prepares financial statements and becomes familiar with special journals, receivables, payables, control accounts, inventory, depreciation, deferrals, accruals, and payroll.
3 hours of lecture, 2 hours of lab per week

Aviation (AER)

AER 1005 Introduction to Aviation Careers (3) **fall**
This course presents an overview of aviation career opportunities for a student interested in becoming a professional pilot, flight attendant, dispatcher, mechanic, or a member of ground crew and the safety system that supports the aviation industry. The student visits aviation facilities and speaks to professionals in the field, including air traffic control, aircraft maintenance, airport operations, airline pilots, and crew members. An introductory flight with a separate fee may be arranged.
3 hours of lecture per week

AER 1010 Private Pilot: Ground (3) **fall**
This course presents the necessary aeronautical knowledge to pass the FAA Private Pilot written knowledge exam and oral exams for a Private Pilot certificate, Airplane category rating, Single-Engine Land class rating.
3 hours of lecture per week Corequisite: AER 1021

AER 1021 Private Pilot: Flight I (1) **fall**
This course is one of two that provide the necessary aeronautical skill and experience to achieve the FAA Private Pilot certificate, Airplane category, Single-Engine Land class rating. The student has individual flight training with a Certified Flight Instructor, who teaches in accordance with all facets of the FAA Private Pilot Airman Certification Standards. This flight course provides 30 of the 55 minimum hours for the flight school requirements. Flight fees include a combination of aircraft, simulator, and flight instructor time. Any student who requires additional hours above the flight course is responsible for the cost.
30 flight hours per term Corequisite: AER 1010
[Course fee: $12,932]

AER 1022 Private Pilot: Flight II (1) **spring**
This course is a continuation of AER 1021. The student has individual flight training with a Certified Flight Instructor, who teaches in accordance with all facets of the FAA Private Pilot Airman Certification Standards. This flight course provides 25 of the 55 remaining minimum hours for the flight school requirements. Flight fees include a combination of aircraft, simulator, and flight instructor time. The published flight fees do not include the FAA Private Pilot practical flight test; additional fees include both aircraft rental and Designated Examiner fees. Any student who requires additional hours above the flight course is responsible for the cost.
25 flight hours per term Prerequisite: AER 1021

AER 1053 Aerodynamics & Practical Flight Applications (4) **spring**
This course is an algebra- and trigonometry-based course in aerodynamics related to practical flight applications and specifically addresses aviation topics including linear and curved motion studies; kinematics; force; statics; dynamics; work and energy; impulse and momentum; rotary motion; and fluids. Vector analysis plays an important role in developing conceptual models to explain cause and effect. The student conducts investigations, collects data, and interprets the results using graphical analysis. The application of mathematical models to observed events enhances the development and reinforcement of conceptual understanding.
3 hours of lecture, 2 hours of lab per week Prerequisite: MAT 1311
[Course fee: $50]

AER 1110 Pilot Instrument Rating: Ground (3) **spring**
This course provides the required knowledge for a pilot to obtain an instrument rating which qualifies operations under Instrument Flight Rules (IFR) and provides the knowledge necessary to pass the FAA Instrument Rating written knowledge exam, Airplane category, Single-Engine Land class rating. It focuses on aeronautical knowledge, full procedural aspects of published instrument navigation, and instrument approaches.

Topics relate to attitude flying, radio navigation aids, IFR systems, and partial panel exercise for approaches. The student reviews FAA test questions to prepare for the required FAA Instrument Rating Knowledge Exam and the FAA oral exam for the Instrument rating.

3 hours of lecture per week — Prerequisite: AER 1021
Corequisite: AER 1120

AER 1120 Pilot Instrument Rating: Flight (2) — **spring**

This course provides training in aeronautical skill and procedures using both AATD simulators and airplanes to acquire the FAA Instrument Rating, Airplane category. It builds skills of basic attitude flying, navigation, and air traffic control phraseology in the IFR environment. The student experiences flight solely by reference to instruments, by first practicing in advanced training devices followed by airplane training while wearing a vision-limited hood or by flying in actual instrument conditions. Instruction includes full training in instrument navigation on cross-country trips with multiple instrument approaches. The end result is an FAA Instrument: Airplane rating added to the student's pilot certificate. Training is conducted in flight stages with stage exams until completion. The course consists of 52 flight training hours; all students pay the same flight fees based on the number of flight hours.

52 flight hours per term — Prerequisite: AER 1021
[Course fee: $12,307] — Corequisite: AER 1110

AER 2010 Commercial Pilot: Ground (3) — **fall**

This course provides the necessary aeronautical knowledge to pass the FAA Commercial Pilot written knowledge exam and oral exams for a Commercial Pilot certificate, Airplane category, Single-Engine Land class rating with emphasis on advanced knowledge, regulations, and performance expectations for higher-level flight skills.

3 hours of lecture per week — Corequisite: AER 2031

AER 2031 Commercial Pilot: Flight I (2) — **spring**

This course is the first of two that provide the necessary aeronautical skill and experience to meet FAA requirements for a Commercial Pilot certificate, Airplane category, Single-Engine Land class rating. The student has individual flight training with a Certified Flight Instructor, who teaches in accordance with all facets of the FAA Commercial Pilot Airman Certification standards and includes both dual instruction and solo flying. This flight course provides 65 of the 120 minimum hours for the flight school requirements. Flight fees are based on the hours required by the Part 141 course and include a combination of aircraft, simulator, and flight instructor time. The published flight fees do not include the FAA Commercial Pilot practical flight test; additional fees include both aircraft rental and Designated Examiner fees. Any student who requires additional hours above the flight course is responsible for the cost.

80 flight hours per term
[Course fee: $17,855] — Corequisite: AER 2010

AER 2032 Commercial Pilot: Flight II (2) — **summer**

This course is a continuation of AER 2031. The student has individual flight training with a Certified Flight Instructor, who teaches in accordance with all facets of the FAA Commercial Pilot Airman Certification standards and includes both dual instruction and solo flying. This flight course provides 55 of the 120 remaining minimum hours for the flight school requirements and is practice-intensive for flight skill building. Flight fees are based on the hours required by the Part 141 course and include a combination of aircraft, simulator, and flight instructor time. The published flight fees do not include the FAA Commercial Pilot practical flight test; additional fees include both aircraft rental and Designated Examiner fees. Any student who requires additional hours above the flight course is responsible for the cost.

40 flight hours per term — Prerequisite: AER 2031
[Course fee: $8,782]

AER 2110 Aviation Safety & Accident Investigation (3) — **fall**

This course provides a fundamental understanding of safety factors in aviation operations and sufficient knowledge to prepare for safety components of advanced FAA certifications with particular attention on safe operation of small aircraft, managing distractions, communication, attitudes towards safety, and cultivating a firm commitment to safe operations at all times. The student uses actual NTSB accident reports to explore, analyze, and discuss the complex and interacting factors involved with aircraft accidents and the methodology of subsequent investigation. They attend at least two FAASTeam safety seminars.

3 hours of lecture per week

AER 2130 Aviation History (3) — **spring**

This course explores the history of aviation from its earliest concepts and first practical flying machines to war birds, airliners, and modern aircraft. The student learns about the evolution of aviation technology including engines, materials, and aerodynamics. General world history provides a contextual background and enhances student understanding of how aviation has shaped the world. Topics include important historical figures, their personalities, and why and how they became fixtures in history.

3 hours of lecture per week

AER 2330 Aviation Physiology & Psychology (3) — **spring**

Pilots have unique mental and physical demands that are critical for their safety-sensitive roles in ensuring safety and passenger comfort. This course focuses on understanding these demands and ensuring compli-

ance from a regulatory and an ethical standpoint. The physiology component focuses on general health with emphasis on altitude physiology, vision, hearing, medications, and fitness. The psychological component emphasizes aeronautical decision-making, risk management, sleep, and fatigue. Both are integrated into a discussion of the FAA medical certification process and pilot duties and responsibilities of compliance.
3 hours of lecture per week

AER 2802 Aviation Fieldwork/Internship (3) **spring**
In this career-focused course, the student has the opportunity to get hands-on professional experience as pilot, flight instructor, or with aviation community partners. The student logs actual fieldwork hours; completes self-evaluations and weekly briefings of completed learning goals; and completes a review of an aviation-related book. The student must attend at least one professional development workshop, career fair, or conference and complete a briefing. Upon completion of the course, the student presents an evaluation from their fieldwork supervisor, two letters of recommendation for future employment, and a presentation of their work.
3 hours of internship per week

AER 3010 Certified Flight Instructor: Ground (6) **fall**
This capstone course uses the student's extensive Commercial Pilot knowledge to teach instructional skills. There is strong emphasis on the fundamentals of instructing and scenario-based training. Through the creation of weekly lesson plans delivered in the classroom with peers and in the broader community, the student builds confidence in their aviation knowledge and delivery; explore and understand their own learning and teaching styles; and recognize and support individual learners. Concepts, techniques, procedural training methods, and adult learning is augmented with applied activities aimed at developing an efficient, effective CFI equipped to provide individualized one-on-one training. Emphasis is on the learning individual and the judgment needed for this high-risk environment. Upon completion, the student may complete aircraft flight instruction with a senior CFI and step into their first job as a professional flight instructor.
6 hours of lecture per week Corequisite: AER 3020

AER 3020 Certified Flight Instructor: Flight (2) **fall/spring**
This hands-on capstone course provides the necessary aeronautical skill and experience to meet the requirements for the FAA Certified Flight Instructor: Airplane certificate. The certificate provides authorization to train pilots for FAA certificates and ratings while building Pilot-in-Command flight time. Flight training prepares applicants with the knowledge, experience, and flight and communication skills to meet the requirements of the Flight Instructor Airman Certification Standards and pass the FAA Flight Instructor practical test. Published flight fees are based on the number of flight hours and do not include the FAA Flight Instructor practical flight test; additional fees include both aircraft rental and designated examiner fees. Any student who requires additional hours above the flight course is responsible for the cost.
15 flight hours per term
[Course fee: $4,473] Corequisite: AER 3010

AER 3030 Human Factors, Risk Management, & Crew Resource Management (3) **fall**
As professionals in global aviation, pilots must demonstrate resiliency, critical thinking, leadership, decision-making, and stress management. This course allows the student to develop into their personal best as a pilot and essential part of a professional team. Using the latest research and training techniques from airlines and FAA programs, they learn to use threat and error management, single pilot resource management, and crew resource management as integral parts of their training and flying.
3 hours of lecture per week

AER 3040 Aircraft Maintenance for Pilots (3) **fall**
In this course, the student gets in-depth, hands-on learning with the mechanics of aircraft systems and components. Through practice in an approved aircraft and power plant maintenance training facility, the student becomes familiar with the tools for performing FAA-approved pilot maintenance tasks. The class covers the specific federal aviation regulations which govern pilot maintenance and the student keeps a maintenance log of their work. The student can write-up a faulty or inoperative system and communicate effectively with mechanics as they manage the maintenance and repair of the aircraft for which they're responsible.
2 hours of lecture, 1 hour of lab per week
[Course fee: $150]

AER 3080 Airline Operations & Management (3) **fall**
This course gives a broad perspective of airline operations and management. Topics include the role of air transportation in global economic development; alternative strategic approaches to route structure and product design; fleet selection; finance and revenue management; distribution systems including the role of travel agencies, freight forwarders, global distribution systems, and internet portals; the regulatory foundation of international aviation; and the effects of liberalization, privatization, mergers, and emerging global alliances.
3 hours of lecture per week

AER 3110 Aviation Law (3) **spring**
This course provides professional guidance on aviation law to aviation professionals, including how the legal system works in relation to aviation, administrative agency regulations, and decision-making based on Federal Aviation Regulations, which establish standards of legal behavior to hold professionals accountable. Given the ease with which civil aircraft cross national borders as part of transportation's key role in today's global economy, it also covers international concerns controlled by the Chicago Convention and its sev-

eral Annexes published by the International Civil Aviation Organization emphasizing current statutory and regulatory changes. The student is taken through many real-life scenarios and discussions to give a vivid experiential basis for decision-making in their aviation careers.
3 hours of lecture per week

AER 4010 Multi-Engine Land: Ground & Flight (1) spring
An FAA Multi-Engine rating gives a competitive advantage when seeking employment within the commercial aviation sector. This course is all hands-on flight time, tutoring with the instructor, and observing peers in the cockpit or in a simulator. From the fundamentals of flying multi-engine aircraft and the aerodynamic laws that govern multi-engine flight to the challenging task of learning related aeronautical knowledge, the student becomes a proficient and knowledgeable multi-engine pilot. They practice to proficiency under dual instruction for all multi-engine training and master the content for an added Multi-Engine Land rating to their Commercial Pilot certificate and Instrument rating.
10 flight hours per term
[Course fee: $4,729]

AER 4020 Certified Flight Instructor: Instrument Ground & Flight (1) spring
In this course, the student applies pilot and flight instructor skills to teach students seeking instrument ratings. This adds the Instrument Instructor rating to their Certified Flight Instructor certificate and is one of the three ratings the student receives on their CFI. The new FAA certification is Certified Flight Instructor: Instrument Airplane, also known as the Double I rating.
10 flights hours per term — Prerequisite: AER 3020
[Course fee: $3,089]

AER 4030 Certified Flight Instructor: Multi-Engine Ground & Flight (1) spring
In this course, the student learns the skills necessary to train pilots for Multi-Engine ratings. The student is already a skilled pilot with the basic Certified Flight Instructor: Airplane credentials, so emphasis is on honing instructional skills to train pilots on multi-engine aircraft. At the end of the course, the student receives their CFI: Multi-Engine rating. This is one of the capstone skill sets and certifications that gives an important advantage in getting a job as a fully-qualified flight instructor or commercial pilot.
15 flight hours per term — Prerequisite: AER 4010
[Course fee: $6,685]

AER 4040 Corporate Aviation & Career Preparation (3) fall
In this course, the student gets a broad perspective on jobs in the world of aviation with focus on the culture and operational differences in aviation businesses such as airline, charter, corporate, fractional, and owner-flown operations. The student follows the steps needed to apply for jobs, network, create an aviation resume, complete job applications, and give a successful interview and discovers the kinds of ethical dilemmas they may face in their career. They learn to sort out the many opportunities available and get tips on responding effectively to pressure to compromise safety, personal values, or income.
3 hours of lecture per week

AER 4050 Training & Flying Advanced Airplanes (3) spring
This course presents an in-depth study of typical complex aircraft systems and aerodynamic flight characteristics. Focus is on individual aircraft systems and the designed purpose of the aircraft. The student prepares for their first professional ground school on an advanced aircraft by utilizing a specific aircraft computer-based training program. They gain insight into the rapidly accelerating pace of change in aircraft design and the utilization, culture, disciplines, language, and structure used in a typical airline pilot training program and bolster their knowledge by studying real FAA Airline Transport Pilot test questions.
3 hours of lecture per week

AER 4060 Introduction to Unmanned Aerial Systems (3) fall
This course provides a general understanding of Unmanned Aerial Systems (UAS or drones), their components, and how they interact and are used. It includes a comprehensive introduction to all of the elements of a complete UAS and addressed topics including the air vehicle; planning and control; mission payloads; data links; launch and recovery concepts; and ethical and legal issues associated with UAS operations.
3 hours of lecture per week

AER 4110 Advanced Transport Category Systems (3) spring
A prospective airline pilot goes through extensive screening that proves their potential to command a jet aircraft. Knowledge of complex systems and operational limits of technical aircraft is essential to success as a professional. This course deals with the flight technology found in modern advanced commercial airline aircraft, both turbofan and turboprop.
3 hours of lecture per week
[Course fee: $200]

AER 4130 High Altitude Navigation & International Flight Operations (3) spring
This course prepares the student to fly in a global world. They explore standard airline operations in the North Atlantic and Pacific Track systems, including flight planning; oceanic control sectors; clearance communications; plotting; track entry/exit; required position or event reports; and ICAO procedures and how they differ from domestic operations. They study hazardous weather, global weather support services, and the special

requirements governing communications, operations, and reporting related to emergency and diversion procedures. They work in a team to plan an international ferry flight.
3 hours of lecture per week

AER 4610 Aviation Senior Project (3) **fall**
In this course, the student applies program knowledge to an aviation project selected, planned, implemented, approved, and presented under the guidance and supervision of faculty and community experts. Their experience is augmented with group-based project management skills including planning, teamwork, problem-solving, leadership, and time management. Each student has the opportunity to assume different roles and responsibilities on the project and is graded by a review of community partners and peers.
3 hours of lecture per week

Agriculture & Animal Science (AGR)

AGR 1011 Agricultural Techniques I (1) **fall**
This course facilitates a successful transition to college and focuses on four primary areas: orientation; basic agricultural skills and related careers; and interpersonal development. The student learns the practical skills necessary to succeed including student rights and responsibilities; good time management; interacting with faculty and classmates; and enhancing academic performance.
2 hours of lab per week plus weekly required farm work experience

AGR 1012 Agricultural Techniques II (1) **spring**
In this course, the student selects an area for independent study, working closely with the farm staff.
2 hours of lab per week plus weekly required farm work experience

AGR 1030 Animal Reproduction & Genetics (3) **spring**
This course focuses on the anatomy and physiology of reproductive systems and the estrous cycle in farm animals, leading to the development of sound breeding and selection skills using simple Mendelian and quantitative genetic principles.
3 hours of lecture per week
[Course fee: $15]

AGR 1050 Livestock Production (3) **fall**
This course focuses on the study of livestock in the New England agricultural industry. Topics include cell biology, beef cattle, sheep, swine, poultry, horses, a brief introduction into nutrition chemistry and technical and practical breeding, feeding, and management.
3 hours of lecture per week

AGR 1061 Burls to Boards (3) **as required**
In this course, the student learns the principles of tree harvesting for wood product production. Topics include choosing, cutting, skidding, and milling common types of lumber in Vermont. Upon completion, the student can manage small woodlots for efficient personal production of lumber products.
2 hours of lecture, 3 hours of lab per week
[Course fee: $15]

AGR 1062 Timber Harvesting (4) **spring**
In this course, the student examines timber harvesting equipment operation, maintenance, and safety and learns the skills needed to administer a timber harvest. They assess land for implementation of a timber harvest management plan which includes proper skid trails; landings; access and erosion control; harvesting ethics; laws; and acceptable management practices. They also map and create a timber harvest plan based on forest inventory and land assessment.
3 hours of lecture, 3 hours of lab per week
[Course fee: $300]

AGR 1801 Forestry Management (4) **spring**
This course introduces the student to the skills needed to create a comprehensive forest management plan for a landowner. Emphasis is on forest silviculture, mensuration, wildlife, and the ability to create a Vermont state current use plan.
2 hours of lecture, 6 hours of lab per week
[Course fee: $25]

AGR 2011 Dairy Herd Management I (4) **fall**
This course covers the skills necessary for the operation and construction of a modern dairy farm. The student evaluates facilities and operations for performance and learns the environmental, biological, and physical factors necessary for the production of high quality milk, while evaluating milk harvesting equipment and practices. Discussion includes the materials used for animal housing and all of the aspects of a highly functional animal environment. Emphasis is on farmstead planning and basic structural concepts for farm buildings, including construction materials and methods, environmental issues, waste management, and feeding systems.
3 hours of lecture, 2 hours of lab per week
[Course fee: $15]

AGR 2012 Dairy Herd Management II (2) **spring**
This course covers the soft skills necessary for the operation of a modern dairy farm. The student synthe-

sizes specific dairy knowledge into farm operational plans using multiple case studies, then models and discusses the habits necessary for the operation of a modern dairy farm. Young stock rearing is discussed in detail.
4 hours of lab per week

AGR 2030 Animal Nutrition (4) **spring**
This course on the fundamentals of livestock feeding includes the study of the nutritive characteristics of forages, grains, and grain products as feeds for different farm animals. The student develops livestock rations and feeding programs based on available feedstuffs and needs for maintenance, growth, and production on the college's dairy herd or the student's home farm.
3 hours of lecture, 2 hours of lab per week
[Course fee: $50]

AGR 2040 Forage Production (3) **as required**
This course emphasizes the production of forage and pasture crops for New England dairy farms. Topics include the selection of adapted crops, varieties, seed mixtures, and soil sites, along with soil preparation, seeding methods, and crop management. Harvesting for best digestible energy and protein is stressed, as is the growing of alfalfa and corn.
2 hours of lecture, 2 hours of lab per week for the first half of the term
[Course fee: $15]

AGR 2050 Large Animal Diseases (3) **as required**
This course covers diseases of major importance in the husbandry of food animals with special emphasis on herd and flock health, disease prevention, basic pathological changes, and the immunological processes involved in the occurrence and prevention of disease.
3 hours of lecture per week

AGR 2060 Beef Production (2) **spring**
This introductory course in beef production addresses topics including marketing and price-making forces; the biological cycle of the beef cow; reproductive management of cows, bulls, and heifers; principles of nutrition; beef genetics and the application of genetic principles to beef herd breeding programs; and animal health issues. Offered every third year.
1 hour of lecture, 2 hours of lab per week

AGR 2110 Sheep Production (2) **as required**
This course includes an in-depth examination of successful sheep production and introduces the student to a range of issues relevant to sheep production, including breeds for different purposes, anatomy, nutrition, reproduction, growth, behavior, health, and marketing options. Offered every third year.
1 hour of lecture, 2 hours of lab per week

AGR 2130 Dendrology (4) **as required**
This course introduces the student to the study of trees, their physiology, taxonomy, silvics, uses, and identification.
3 hours of lecture, 2 hours of lab per week

AGR 3020 Advanced Livestock Production (3) **spring**
In this course, the student learns the reproduction, nutrition, housing, and financial requirements of profitable Vermont livestock operations. Swine, poultry and small ruminant species are covered in detail with some coverage of emerging livestock production including camelids, ostriches, and emus. Offered every third year.
3 hours of lecture per week Prerequisite: AGR 1030, 1050, 2030

AGR 3040 Maple Production: Science & Practice (3) **spring**
This course presents current information relating to all aspects of maple production. It covers principles and practical application of sugarbush management; sap production; maple production facilities and equipment; maple syrup production; product packaging and marketing; and operator safety.
2 hours of lecture, 2 hours of lab per week
[Course fee: $10]

AGR 3050 Applied Nutrient Management Planning (3) **spring**
This course provides the student with the skills needed to submit a nutrient management plan that aligns with Natural Resource Conservation Service and State of Vermont standards. Recommended agricultural practices, watershed management practices, and land use mapping techniques are discussed and demonstrated. Upon completion, the student may sit for the comprehensive nutrient management plan exam.
3 hours of lecture per week

AGR 3110 Apples, Berries, & Bees (3) **fall**
This course presents the production requirements of apples, common berries, and honeybees. Plant or species selection, growing requirements, disease prevention, and harvesting are discussed for each with the goal of competent and comprehensive management.
3 hours of lecture per week

AGR 3111 Vegetable Production (3) **spring**
This course deals with the principles, production, management, and handling of vegetable crops in the con-

text of modern commercial production systems.
3 hours of lecture per week
[Course fee: $25]

AGR 4040 Agricultural Products (3) fall
This course explores basic processing methods, common marketing techniques, and laws pertaining to the sale of the most common Vermont farm products including milk, eggs, maple, vegetables, fruits, cheeses, honey, fiber, and meats.
3 hours of lecture per week

AGR 4802 AGR Senior Summer Internship Review (1) fall
The student documents and communicates their summer internship experience. Pass/No Pass.
1 hour of seminar per week
[Course fee: $250]

Allied Health Science (AHS)

AHS 2035 First Aid & CPR (2) fall
This course introduces first aid and basic principles of assessment and treatment of injury in the workplace. Scenarios and practice take place in outdoor and indoor workplace settings. The successful student can provide first responder stabilization, treatment, and CPR.
4 hours of studio per week
[Course fee: $75]

Architectural Engineering Technology (ARE)

ARE 1000 ARE Freshmen Seminar (1) fall
This course provides a forum for the first-year student to learn about the program, related professions, and the building construction industry and highlights skills that facilitate a successful experience at the college.
1 hour of seminar per week

ARE 1011 Introduction to Construction Drawing Practices (3) fall
This course covers basic instruction in architectural and engineering construction graphics utilizing hand drawing equipment and CAD software and introduces residential construction materials. The student develops a set of drawings for a small residence in keeping with contemporary office practices.
6 hours of studio per week
[Course fee: $20]

ARE 1210 Construction Materials & Methods (5) spring
This course is a comprehensive study of common construction materials and methods of fabrication and installation employed in building construction which covers sources, methods of manufacture, and uses of materials. There are two different studio sessions within this course: the materials lab sessions familiarize the student with physical characteristics and uses of materials, performance of standard tests, and preparation of technical reports. The design/drafting studio involves the detailing of construction assemblies, accurate hand sketches, and CAD.
3 hours of lecture, 3 hours of lab, 3 hours of studio per week — Prerequisite: ARE 1011
[Course fee: $40]

ARE 1220 Architectural History (3) fall/spring
Through photo slide lectures and seminars, the student discovers architectural design philosophies and construction systems that have developed over the ages. Social, political, religious, and economic influences and technological advances are traced from the first significant works of humans 5,000 years ago through the present day. A major focus is western development since the eighteenth century, particularly in North America, and its significance to today's society. Discussion seminars provide follow-up discussions of lectures with the objective of developing visual perception and knowledge of architectural styles and principles through the history of architecture.
3 hours of lecture per week

ARE 2022 Building Information Modeling (3) fall
This course covers advanced instruction in computer-aided drafting and design for architecture and building engineering. *Building Information Modeling* in Revit Architecture develops skills in the industry standard for 3D design. The student explores building design, presentation drawings, and renderings.
6 hours of studio per week — Prerequisite: ARE 1011
Corequisite: ARE 2051

ARE 2031 Environmental Systems I (3) fall
This course covers the natural environmental influences upon building design and construction as well as the principal internal necessities for human habitation, including sanitation; heating and ventilation; and mechanical requirements in small buildings. The studio reinforces the lectures by teaching the student to design plumbing and heating systems for a small residential scale building.
2 hours of lecture, 3 hours of studio per week
[Course fee: $10] — Corequisite: PHY 1042

ARE 2032 Environmental Systems II (3) **spring**
This is a continuation of ARE 2031. Broad-scale aspects of mechanical, electrical, and sanitary systems are investigated as they apply to larger buildings and groups of buildings. Other topics covered include electrical and lighting design; the impact that building codes and other regulations have on buildings; and current environmental topics.
2 hours of lecture, 3 hours of studio per week — Prerequisite: ARE 2031 or CPM 1010
[Course fee $10]

ARE 2040 Construction Practices (3) **fall**
This course combines several distinct areas in the building construction industry. One part introduces fundamental surveying principles and methods: distance measurement, angular measurement, and elevation differences; instrument practice and care for levels; electronic distance measurement instruments; total station equipment; terminology; computations; developing site plans; and construction layout. Another part covers topics in construction estimates and records including estimating, takeoffs, and pricing for both residential and commercial construction. A third part explores construction management principles including scheduling practices, contracts, general conditions, and specifications.
2 hours of lecture, 3 hours of studio per week — Prerequisite: ARE 1210

ARE 2051 Architectural Design I (3) **fall**
In this course, the student develops individual design projects from conception to presentation under faculty supervision. Problem-solving and design process are taught and reinforced throughout the term with major emphasis on graphic techniques for design drawings. Building types studied range from small artifacts to small public buildings. Graphic and oral communication of goals, methods, and solutions are emphasized throughout. Some projects are presented to a jury of architecture faculty and practicing architects.
6 hours of studio per week — Prerequisite: ARE 1011,1220
[Course fee: $20] — Corequisite: ARE 2031

ARE 2052 Architectural Design II (3) **spring**
This course is a continuation of ARE 2051. The design projects and problem-solving in this second term involve more complex buildings. The final project is a real-world building in Vermont. The student learns to work with zoning, building codes, and users while developing oral and graphic communication and presentation skills. The student works in a team on these projects to simulate real-world working dynamics. Projects are presented to a jury of architecture faculty and practicing architects.
6 hours of studio per week — Prerequisite: ARE 2051
[Course fee: $20]

ARE 2720 Architectural & Building Engineering Seminar (1) **spring**
This seminar concentrates on developing knowledge and skills used in the workplace and throughout the student's career. Topics include job skills, continuing education, office practices, and soft skills.
1 hour of seminar per week

ARE 3010 Design Systems Integration (3) **fall**
This course concentrates the student's design thinking in architectural engineering, particularly in the integration of environmental and structural systems into building design. It complements the architectural engineering technology curriculum by introducing the student to the design of sustainable low-energy systems in small buildings and providing tools for analysis in the schematic phase.
6 hours of studio per week — Prerequisite: ARE 3020, 3040, 4030
[Course fee: $20]

ARE 3020 Structural Analysis (3) **fall**
This course covers the analysis of statically determinate and indeterminate structures, building on foundations from a statics course. Topics include deflection analysis; static determinacy and stability; reactions; and member forces and moments in beams, frames, and trusses (and possibly arches and cables) through determinate, indeterminate, and approximate methods. Computer applications for analysis are used. Topics such as matrix methods of analysis or dynamics/structural analysis may also be introduced.
3 hours of lecture per week — Prerequisite: CET 2040; MAT 1520

ARE 3030 Steel Structures Design (4) **spring**
This course covers structural loads (e.g., dead, occupancy, snow, wind, earthquake, rain, and ice) and the design of steel structures, including typical structural elements such as tension members, beams, columns, connections, open web joists, and deck systems. Designs are based on the AISC Steel Construction Manual using the load and resistance factor design methodology. Issues such as economics of construction and sustainability are also addressed.
4 hours of lecture per week — Prerequisite: CET 2120
[Course fee: $10]

ARE 3040 Electrical/Lighting Systems (3) **spring**
This course familiarizes the student with the various electrical and lighting systems commonly found in modern buildings including lighting, power, communications, and emergency systems. It emphasizes design practices, safety/code issues, and coordination with other design professionals and building trades.
3 hours of lecture per week — Prerequisite: ARE 2032 or 3112; ELT 2071

ARE 3050 Fundamentals of Fluids & Thermodynamics (4) **fall**

This course examines the basic concepts and practical applications of fluid mechanics and thermodynamics. Topics include fluid properties and measurement; energy conservation; pipe and duct flow; pumps and fans; the first and second laws of thermodynamics; refrigeration; psychometrics; basic thermodynamic processes; and HVAC.

3 hours of lecture, 3 hours of lab per week — Corequisite: PHY 1042

ARE 4010 Concrete Structures Design (3) **fall**

This course covers the design of typical statically determinate and indeterminate concrete structures, sustainable engineering concepts, and an introduction to concrete masonry. It makes extensive use of the American Concrete Institute building code requirements and considers concrete and steel material properties, design approximations, design of concrete linear members (beams and columns), slabs, foundations, and walls.

3 hours of lecture per week — Prerequisite: ARE 3020; CET 2120

ARE 4020 Architectural Engineering Management (3) **fall**

This course covers many of the business, management, professional, and ethical subjects that architectural engineers and other infrastructure professionals may face during their careers such as legal issues; business organizational frameworks; personnel and diversity issues; business planning and decision making; marketing; scheduling; professional ethics; project and design cost issues (including engineering economics); information management; and technical presentation skills. The student develops communication skills and the ability to analyze management-related situations and create management-related documents.

3 hours of lecture per week — Prerequisite: MAT 1312

ARE 4030 HVAC Systems (5) **spring**

This course addresses the engineering aspects of heating, ventilating, and air conditioning systems design. The focus is on mechanical systems for commercial buildings that include psychometrics; basic HVAC calculations; design condition determination; load estimating; duct and pipe sizing; HVAC systems; and HVAC equipment selection. The student performs system design on a commercial building in preparation for ARE 4720. Energy conservation, comfort condition, indoor air quality, and mechanical codes are introduced using ASHRAE standards and international codes.

4 hours of lecture, 3 hours of studio per week — Prerequisite: ARE 3050 or MEC 2050

[Course fee: $15]

ARE 4040 Plumbing Systems (3) **spring**

A student in this course learns the basic practices and techniques for the design of plumbing systems in buildings using International Plumbing Code Commentary as a basis. Emphasis is on the design and calculations for sizing sanitary waste and vent systems; domestic hot and cold water systems; water heaters; storm drainage systems; and fire sprinkler systems, as well as fixture selection. Each topic includes discussions on materials and methods of construction and installation, code requirements, computer applications, specifications, and drafting symbols and standards.

2 hours of lecture, 3 hours of studio per week — Prerequisite: ARE 3050

ARE 4050 FE Exam Survey (1) **fall**

This course provides the student with applications for and review of engineering, math, and science concepts to prepare for the Fundamentals of Engineering (FE) examination (primarily the “other disciplines” subject area) administered by most states as a first step toward professional licensure as a Professional Engineer. It touches on both previously studied topics and new topics that are generally easier to understand and apply with limited explanation of background material. FE exam topics that are covered heavily in senior ARE courses (e.g., ethics and engineering economics) receive limited coverage. Strategies for studying for and taking the FE exam and similar examinations are covered, as is the application of engineering judgment in general.

3 hours of studio per week

ARE 4720 ARE Senior Project (4) **spring**

This is a capstone course in which the student typically prepares drawings; design or evaluation documentation; and presentations for a commercial-scale project based on preliminary and incomplete architectural plans (such as the ASHRAE national student competition building), an existing built structure, or other information. They work on electrical/lighting, mechanical, or structural systems or an integrated sustainable design of multiple systems.

2 hours of lecture, 6 hours of studio per week — Prerequisite: ARE 2022, 3030, 3040, 4010, 4020, 4030

[Course fee: $10]

Art History (ARH)

ARH 2110 Architectural Study Abroad (1) **spring**

Through location-specific architectural history preparation and travel to overseas locations, this course introduces the student to architectural design philosophies and construction systems that have developed throughout the ages. The destination cycles through locations such as Spain, England, Italy, Germany, and Greece.

1 hour of seminar per week for four weeks, 10 days of foreign travel — Prerequisite: ENG 1061

[Course fee: TBD]

ARH 2210 Architectural & Cultural Study Abroad (3) **spring**

This course immerses the student in the literature, art, and architecture of a foreign city through participation

in coursework combined with a guided travel tour to an overseas location. The student uses visual perception and critical analysis to study the interconnected fields while expanding learning by experiencing works of art and architecture firsthand. The course reinforces the student's understanding of topics in the history, culture, art, and architecture of the country studied. This is a cultural experience intended to enrich and broaden student perspectives in our increasingly global world.
1 hour of lecture, 1 hour of online instruction per week, 10 days of foreign travel — Prerequisite: ENG 1061
[Course fee: TBD]

Atmospheric Sciences (ATM)

ATM 1021 Climate Change Science (3) — **fall/spring**
This course provides the student with a scientific foundation of anthropogenic climate change and an introduction to climate models. It focuses on fundamental physical processes that shape climate (e.g., solar variability; orbital mechanics; greenhouse gases; atmospheric and oceanic circulation; and volcanic and soil aerosols) and on evidence for past and present climate change. The student discusses the material consequences of climate change, including sea level change, variations in precipitation, vegetation, storminess, and the incidence of disease. The course examines the science behind mitigation and adaptation proposals.
3 hours of lecture per week — Prerequisite: MAT 1210

ATM 1031 Meteorology I (3) — **fall**
Meteorology is the scientific study of the atmosphere and weather events that interact with temperature, air pressure, water vapor, and time change across local, regional, and intercontinental geographies. This course provides the student with a foundation for understanding and applying weather factors to the safe operation of aircraft in preparation for the FAA knowledge exam for safe operation and for earning a Private Pilot certificate.
3 hours of lecture per week

ATM 1032 Aviation Meteorology II (4) — **spring**
This course explores applicable weather conditions and how they impact aircraft operations, allowing for accurate analysis for both preflight and in-flight application. It builds on the basics as they apply to the dynamics of flight conditions: turbulence, icing, thunderstorms, and low visibility related to instrument flight operations. The student provides feedback on the effectiveness of interpretations by using web-based weather products.
3 hours of lecture, 2 hours of lab per week — Prerequisite: ATM 1031

Automotive Technology (ATT)

ATT 1011 Suspension & Steering I (1.5) — **fall**
This course is a comprehensive study of the theory, construction, and design of vehicle steering and suspension systems with emphasis on the geometry of links and levers; vehicle suspension requirements; vehicle handling and dynamics; and diagnosis of suspension problems.
2 hours of lecture, 3 hours of lab per week for the first half of the term
[Course fee: $200]

ATT 1012 Suspension & Steering II (1.5) — **fall**
This course is a continuation of ATT 1011.
2 hours of lecture, 3 hours of lab per week for the second half of the term — Prerequisite: ATT 1011

ATT 1013 Preventative Maintenance (2) — **fall**
This course covers development and administration of preventive maintenance programs. Topics include engine, transmission/transaxle, suspension, and steering and brake system general service and inspection procedures based on NATEF MLR tasks; supplemental tasks on shop/personal safety, tool, and equipment usage and maintenance; and preparing the vehicle for service and returning it to the customer.
1 hour of lecture, 3 hours of lab per week
[Course fee: $200]

ATT 1020 Engine Diagnostics & Repair (4) — **fall**
This course is a comprehensive study of the theory, construction, design, and repair of the internal combustion engine. Topics include engine classification; power and torque development; engine power-efficiency tests; engine performance parameters; and mechanical design and failure analysis. The lab reinforces the lecture by providing engine performance diagnostic procedures, mechanical repair, and overhaul procedures. System problem diagnosis and component failure analysis are continually stressed.
3 hours of lecture, 3 hours of lab per week
[Course fee: $200]

ATT 1051 Alignment & Brakes I (2) — **spring**
This course gives the student a thorough understanding of the theory, construction, and design of the mechanical devices utilized in tires; wheels and bearings; and hydraulic braking systems. Emphasis is on the geometry of links and levers; the physics of friction and hydraulics; vehicle braking requirements; vehicle handling and dynamics; wheel alignment procedures and equipment; and the diagnosis of brake problems. The course includes the curriculum necessary for successful completion of the Vermont state inspection certification test. Any student who is already certified receives credit for the inspection portion of the course.
3 hours of lecture, 3 hours of lab per week for the first half of the term — Prerequisite: ATT 1012
[Course fee: $200]

ATT 1052 Alignment & Brakes II (2) **spring**

This course is a continuation of ATT 1051.

3 hours of lecture, 3 hours of lab per week for the second half of the term Prerequisite: ATT 1051

ATT 1090 Automotive Electronics Lab (1) **fall**

This is the automotive lab for GTS 1120 which uses electrical test equipment to analyze and troubleshoot basic electrical circuits including warning systems, electrical accessories, and battery starting and charging systems.

3 hours of lab per week Corequisite: GTS 1120

[Course fee: $100]

ATT 1110 Automotive Electrical Systems Lab (1) **spring**

This is the automotive lab for GTS 1040 which covers electrical systems and diagnostic and troubleshooting skills. Topics include the operation and testing of storage batteries, starting systems, charging systems, ignition systems, and basic accessory systems. The student becomes familiar with various types of test equipment, diagnostic charts, and vehicle wiring schematics.

3 hours of lab per week Corequisite: GTS 1040

[Course fee: $100]

ATT 2010 Engine Performance (4) **fall**

This course covers fuel delivery systems in the internal combustion engine. Topics include engine air/fuel requirements, gasoline fuel injection systems, diesel fuel injection systems, vehicle emissions, emission controls, fuel-related problems, diagnosis of component failures, and verification of repairs.

3 hours of lecture, 3 hours of lab per week Prerequisite: GTS 1040; PHY 1030

[Course fee: $200]

ATT 2020 Body Electronic Systems (4) **fall**

This course covers commonly used body systems including heating, ventilation, and air conditioning; instrument panels; airbags; and antilock brakes. The student becomes familiar with system operation, diagnostic techniques, system failure analysis, and repair. The lab offers experience in diagnosis and repair of these systems as well as more practice in using electrical diagnostic techniques.

3 hours of lecture, 3 hours of lab per week Prerequisite: ATT 1012; GTS 1040; PHY 1030

[Course fee: $200]

ATT 2030 Advanced Engine Performance & Fuel (4) **spring**

This course covers the electronic controls and devices used on the modern automobile power train. Topics include the theory, design, operation, and application of various domestic and foreign electronic control systems; analysis of system problems; diagnosis of system failures; component and system test procedures; sensors; emissions systems; advanced drivability diagnostics; exhaust gas analysis; and causes of premature component failure.

3 hours of lecture, 3 hours of lab per week Prerequisite: ATT 2010

[Course fee: $200]

ATT 2040 Automotive Drive Trains (4) **spring**

This course covers the principles of construction, design, and operation of mechanical devices used in the modern automotive drive train. Topics include helical and planetary gear drive systems; torque converters; hydraulic control systems; principles of electronically controlled transmissions; clutches; manual transmission and transaxles; drive shafts and axles; universal and CV joints; differentials; transfer cases; and problem diagnosis and component failure analysis.

3 hours of lecture, 3 hours of lab per week Prerequisite: ATT 1012

[Course fee: $200]

ATT 2060 Advanced Technology Vehicle (4) **spring**

This course introduces the design operation and servicing of electric, hybrid, alternative fuel, and fuel cell vehicles. Topics include basic physics- and chemistry-influenced design; motor and generator design and utilization; hybrid electric design variations; maintenance and service; light-duty diesel; and CNG vehicles.

3 hours of lecture, 3 hours of lab per week Prerequisite: GTS 1040

[Course fee: $200]

ATT 2802 ATT Summer Internship Review (1) **fall**

This course is a one-credit internship review. Pass/No Pass.

[Course fee: $250]

Biological Sciences (BIO)

BIO 1020 Introduction to Environmental Biology **(4)** **fall**

This course introduces the student to the fundamentals of environmental biology: the structure and biota of several aquatic and terrestrial ecosystems, including Vermont ecosystems. It includes spatial and temporal changes in ecosystems and species; critical observation and interpretation of landscapes; and communication skills, critical thinking, and teamwork. The student investigates why species occupy specific habitats.

3 hours of lecture per week, 4 hours of lab every other week

[Course fee: $10]

BIO 1030 Introduction to Nutrition **(3)** **fall**

This course introduces the student to the physiological basis of nutrition and evaluates dietary requirements with emphasis on metabolism, digestion, the nutrients used in the human body, and the nutrition involved in health, disease, and aging.

3 hours of lecture per week

BIO 1040 Principles in Biology (4) **fall**

This course imparts a general knowledge of biology from the molecular level to whole systems. Topics include cell chemistry, evolution, genetics, ecology, diversity, and population dynamics. When applicable, the class focuses on biological aspects of Vermont.

3 hours of lecture, 3 hours of lab per week

[Course fee: $10]

BIO 1220 Botany **(4)** **spring**

This course covers the fundamentals of plant growth and development, including higher plant structure, metabolism, growth regulators, and mineral nutrition. The student becomes acquainted with the diversity of plants and plant-like organisms through the study of bacteria, viruses, algae, fungi, mosses, and lower vascular plants.

3 hours of lecture, 3 hours of lab per week

BIO 1241 Introduction to Forest Ecology (4) **fall**

In this course, the student learns the functions of a forest ecosystem, tree identification, silviculture practices, and the significance of natural communities such as vernal pools and wetlands. A central component of the course is a lab that studies the natural communities that comprise Vermont forests.

3 hours of lecture, 3 hours of lab per week

[Course fee: $25]

BIO 2011 Human Anatomy & Physiology I **(4)** **as required**

This is the first of two courses which examine the structure and functions of the human body. Topics include fundamental principles of cell and tissue structure; gross anatomical and physiological organization; electrochemical communication systems; and muscle physiology. Prior successful completion of basic algebra and chemistry or biology courses is recommended.

3 hours of lecture, 3 hours of lab per week

BIO 2012 Human Anatomy & Physiology II **(4)** **as required**

This is a continuation of BIO 2011 which examines the structure and functions of the human body. Topics include special senses, blood, and the endocrine, cardiovascular, respiratory, digestive, urinary, and reproductive systems.

3 hours of lecture, 3 hours of lab per week Prerequisite: BIO 2011

BIO 2030 Plant Pathology (3) **spring**

In this course, the student explores the organisms and environmental factors that cause plant diseases; extensively studies the biology of fungi, bacteria, and viruses, including their life histories; examines a systematic approach to discovery and identification of plant disease; and learns to recognize disease symptoms. Methods of disease management are covered with emphasis on bio-rational techniques.

2 hours of lecture, 3 hours of lab per week Prerequisite: BIO 2040

BIO 2040 Entomology & Ecological Pest Management (3) **fall**

This course examines the biology and management of insect and other invertebrate pests that attack ornamental , agricultural, and forest plants. The student studies insect morphology, anatomy, life processes, and ecology with special emphasis on insect identification and life histories and explores management strategies as part of an integrated approach to pest management.

2 hours of lecture, 3 hours of lab per week

BIO 2120 Elements of Microbiology **(4)** **as required**

This course is a comprehensive study of the basic principles of microbiology with a brief survey of the history of the science. It offers the student an opportunity to examine organisms that are too small to see with the naked eye with emphasis on understanding the variety of and differences in microbes and their relationship to humans. Prior successful completion of BIO 2012 is recommended.

3 hours of lecture, 3 hours of lab per week

[Course fee: $10]

BIO 2320 Zoology **(4)** **fall**

This course acquaints the student with the fundamental concepts of animal biology, including molecular genetics and inheritance, evolution, and biological systems with an emphasis on vertebrates. Prior successful completion of courses in biology and chemistry is recommended.

3 hours of lecture, 3 hours of lab per week

Business (BUS)

BUS 1341 Exploring Business & Entrepreneurship **(3)** **fall**

This course surveys the key characteristics and terminology of the interconnected disciplines of economics, ethics, entrepreneurship, management, marketing, accounting, operations, and information technology. It allows the student to discuss business ethical issues and to explore the opportunities and challenges of

starting a new business. It facilitates college success strategies and use of college resources and introduces the student to assignments typical of higher-level business courses with the goal of developing effective oral and written communication, critical thinking, problem solving, interpersonal skills, and ethical behavior.
3 hours of lecture per week

BUS 2020 Principles of Management **(3)** **fall**
This course introduces the philosophy, principles, and techniques of management. The student examines classical, modern, and emerging concepts as they relate to today's manager and the functional processes of planning, organizing, directing, and controlling resources. Learning experiences may include case studies, team experiences, and simulations.
3 hours of lecture per week

BUS 2041 Foundations of Entrepreneurship (3) **fall**
This course explores the nature, challenges, and rewards of entrepreneurship, which is approached as a special and unique way of thinking and behaving and a predictable and manageable process applicable to profit, non-profit, and public organizations.
3 hours of lecture per week

BUS 2140 Personal Finance **(3)** **as required**
The heart of personal financial planning is making sure that your values line up with how you spend and save. This course removes the mystery from the personal financial planning process and replaces it with the tools needed to take charge of personal finances and life. Personal financial planning provides major benefits that help marshal and control financial resources more effectively and facilitate an improved standard of living. Because the emphasis in this course is on planning, it examines various areas to set and implement plans aimed at achieving financial goals. These areas include using financial statements and budgets; managing basic assets, credit, insurance needs, and investments; and planning for retirement.
3 hours of lecture per week
[Course fee: $10]

BUS 2210 Small Business Management **(3)** **fall/spring**
This course explores the practical aspects of organizing and managing a small business. It covers the basic concepts of accounting, finance, cash management, business law, government regulations, taxes, and marketing. The student gains the knowledge necessary to make informed business decisions by examining how to analyze a business and improve its management.
3 hours of lecture per week
[Course fee: $10]

BUS 2230 Principles of Marketing **(3)** **spring**
This course examines the role of marketing as it relates to manufacturing, wholesale, retail, and service businesses. Emphasis is on the marketing mix of product, place, promotion, and price. The student learns marketing strategies well-suited to small business.
3 hours of lecture per week
[Course fee: $10]

BUS 2270 Interpersonal & Oral Communication (3) **as required**
This class offers a hands-on approach to learning the roles, processes, and skills of interpersonal, group, and public communication in personal and professional settings. The student understands the role of people in the communication process, both individually and in groups, and learns the psychology of face-to-face communication, the role of non-verbal communication, teamwork, effective listening, and professional behavior and then plans, prepares, and presents team oral presentations.
3 hours of lecture per week
[Course fee: $65]

BUS 2350 Leadership Development **(3)** **spring**
This course focuses on the development of leadership ability by providing a basic understanding of leadership and group dynamics theory, including goal setting, decision making, problem solving, delegation, motivation, and performance evaluation. The student develops a personal philosophy of leadership; an awareness of the moral and ethical responsibilities of leadership; and an understanding of their own ability and style of leadership.
3 hours of lecture per week

BUS 2410 Human Resource Management **(3)** **spring**
This course introduces the student to the field of human resource management (HRM). Coverage is broad and emphasizes selecting, training, and evaluating personnel; wages, benefits, and bargaining units; motivation, morale, and human relations; and personnel problems in the workplace. The course emphasizes a general management perspective of HRM. Specifically, rather than assuming that the student wants to become an HR professional, we examine HRM from the perspective of a manager who wishes to effectively interact with and utilize human resources.
3 hours of lecture per week

BUS 2440 Introduction to Business Law (3) **fall/spring**
This course familiarizes the student with the law as it relates to business. Following a review of the legal and constitutional environment of business, the course focuses on contract law; the Uniform Commercial Code;

negotiable instruments; debtor and creditor rights; bankruptcy; and agency relationships.
3 hours of lecture per week
[Course fee: $10]

BUS 3041 Applied Entrepreneurship (3) **fall**
This course takes the fundamentals of entrepreneurship and applies them to business cases and fieldwork. It is divided into two sections: creating and pitching a new business concept and evaluating an existing entrepreneurial venture through fieldwork. The student works in a team to create, evaluate, and develop a concept for a new entrepreneurial venture for either a profit or non-profit mission. They also engage in fieldwork with an existing organization engaged in entrepreneurial activities. Organizations may be identified by the student or through client-based service providers (VT SBDC, VMEC, United Way, VBSR).
3 hours of lecture per week

BUS 3150 Production & Operations Management **(3)** **fall**
This course provides an overview of the concepts, methodologies, and applications of production and operations management as an evolving discipline with roots in industrial engineering, behavioral theories of management, quantitative methods, and other functional areas of business.
3 hours of lecture per week — Prerequisite: MAT 2021

BUS 3230 Principles of Financial Management **(3)** **fall**
This course teaches the student to use accounting data to make financial decisions. They learn decision-making techniques and use them to address financial situations faced by a firm.
3 hours of lecture per week — Prerequisite: ACC 1020 or 2121
[Course fee: $10]

BUS 3250 Organizational Behavior & Management **(3)** **spring**
This course provides an understanding of the structure and function of human behavior in organizations and explores the behavioral influences impacting productivity, organizational effectiveness, and efficiency. Behavior is examined at the individual, small group, and organizational levels. Topics include perception, motivation, negotiation, decision-making, communication, job design, power, politics, and organizational culture.
3 hours of lecture per week — Prerequisite: BUS 2020

BUS 3410 Business Ethics (3) **fall**
This course introduces the student to the general field of ethics and teaches them to apply ethical thinking to the business environment. It provides an overview of modern ethical thought and presents specific cases and scenarios which the student assesses from legal, moral, and economic perspectives.
3 hours of lecture per week — Prerequisite: BUS 2020

BUS 3721 Business Planning Seminar (3) **spring**
This course teaches how to estimate market potential for a business idea and provides a realistic experience in preparing a business plan that attracts lenders or investors. It emphasizes the importance of market research and collection of the information necessary to establish the viability and sustainability of a business idea. There is heavy emphasis on knowing the target market, analyzing competition, and anticipating how the external environment affects a business. The student should already have a business idea or a technology to develop. During the term, they repeatedly defend their ideas with peers and invited guests. The development and presentation of a sound business plan is the final product.
3 hours of seminar per week — Prerequisite: BUS 2210, 3230

BUS 3811 Business Problem Practicum (3) **spring**
This course serves as both a practice and a capstone in team research and presentations, integrating skills and knowledge developed through previous coursework. The student works in a team to select a business topic for research and oral presentation. Where appropriate and with the instructor's approval, they may select a client-based problem. Teams present a significant business problem, offer proof of the problem, recommend solutions, and give evidence that the solutions help solve the problem. A team oral presentation is the final product.
3 hours of lecture per week

BUS 4080 Business Strategy & Policy Development **(3)** **as required**
This capstone integrates knowledge gained throughout the program and applies it to a variety of business case studies, concentrating on the total enterprise and its environment. The student assumes the functions and responsibilities of senior management, addresses the crucial problems that affect success in the organization, and makes decisions that determine the direction and future of the organization. They engage in strategy formulation and development and the administration of those strategies through policies, structures, and initiatives. The course may include case studies, simulations, team projects, and presentations.
3 hours of lecture per week

BUS 4310 Writing for Workplace Success (3) **spring**
In this course, the student learns and applies theory, process, design, and development to create effective, user-centered written and electronic communications. The course focuses on the convergence of communication technology and tools and the impact on business applications such as letters, email messages, instant messages, podcasts, and a variety of social media. The student designs and creates an online portfolio to showcase education, skills, abilities, and experience for a job search.
3 hours of lecture per week

***BUS 4530 Technical Project Management* (3)** **spring**
This course introduces the student to the field of project management. Coverage is broad and emphasizes and follows the Project Management Institute model of project management.
3 hours of lecture per week

Civil & Environmental Engineering Technology (CET)

CET 1000 CET Freshman Orientation (1) **fall**
This course introduces the skills required for success in the Civil & Environmental Engineering Technology program. The course features guest speakers and field trips to construction projects and public facilities that give the student a picture of the variety of work and the job opportunities in the field. Pass/No Pass
2 hours of seminar per week for the first half of the term

CET 1011 Surveying I (3) **fall**
This course introduces fundamental surveying principles and methods including benchmark leveling; the measuring of distances and angles; and instruction and practice in the care and use of equipment. Areas covered are azimuths and bearings; coordinate geometry; cross-sections and profiles; note-keeping; computations and field practice related to traverses; introduction to total stations and point files; and the adjustment of surveying instruments. The basics of construction surveying are discussed.
2 hours of lecture, 3 hours of lab per week Corequisite: MAT 1311

CET 1020 Engineering Materials (3) **spring**
In this course, the student studies and tests the materials used in the design and construction of civil engineering projects including soil, aggregates, cements, concrete, timber, asphalt, steel, masonry, and special topics (glass or geotextiles). Sources, manufacture, transport, standard tests, best use, and environmental considerations are covered. Lab work involves testing of materials and technical reporting.
2 hours of lecture, 3 hours of lab per week
[Course fee: $35]

CET 1031 Engineering & Surveying Computer Applications I (2) **fall**
This course focuses on the use of computers in civil and environmental engineering and introduces Excel and CAD operation for engineering applications. It presents the fundamentals of CAD operations through the use of topics including site, structural, and environmental drawings. Major graphic subjects include creating and editing CAD primary and complex entities, dimensioning, drawing construction, layout, and output. It introduces spreadsheets using including calculations, quantities, estimates, and graphs.
6 hours of lab per week
[Course fee: $35]

CET 1032 Engineering & Surveying Computer Applications II (2) **spring**
This course is a continuation of CET 1031 which provides proficiency in creating and understanding working drawings related to civil engineering. CAD topics include advanced CAD entity manipulation, customization, and programming. The student is introduced to a civil survey software package used for site mapping, terrain modeling, and road and utility design in addition to related technologies such as Geographic Information Systems, their applications, and data sources.
6 hours of lab per week Prerequisite: CET 1031

CET 2012 Surveying II (4) **fall**
A continuation of CET 1011, this course gives additional and more detailed information in route location and design, construction surveying, and advanced surveying topics. State-of-the-art total stations are used in the field labs. Traverse adjustment is introduced. Interfacing total stations with COGO surveying software is an integral portion of the course.
2 hours of lecture, 6 hours of lab per week Prerequisite: CET 1011,1032
[Course fee: $40] Corequisite: MAT 1520

CET 2020 Hydraulics & Drainage (3) **fall**
This course introduces the fundamental concepts of fluids and the applications of flow mechanics in civil and environmental engineering projects. Topics include open channel flow, precipitation, stormwater runoff, infiltration, groundwater, watershed drainage systems, measuring devices, buoyancy, and steady flow. Calculations and lab work involve the use of precipitation data; culvert and stormwater system design; flume and hydraulic bench experiments; and the use of current industry standard computer programs.
2 hours of lecture, 3 hours of lab per week Prerequisite: MAT 1312; PHY 1041
Corequisite: MAT 1520

CET 2030 Environmental Engineering & Science (3) **spring**
This course emphasizes quantitative analysis of environmental problems and introduces engineering methods for treatment and prevention of water, soil, and air pollution. It covers fundamental concepts of chemistry, microbiology, ecology, and statistics, which are critical to environmental analysis and engineering design. The lab includes both field and indoor testing of water quality as well as field trips to environmental facilities.
2 hours of lecture, 3 hours of lab per week Prerequisite: CHE 1031; MAT 1520; PHY 1041

CET 2040 Statics & Strength of Materials (4) **fall**
Statics involves the study of vector forces, resultants, and moments and their effect on beams, columns,

frames, and trusses. Strength of materials includes the study of material properties; tension; compression; shear and bending stresses; and the general mechanical response of materials and members to loads and the environment. This course includes methods of determining centroids and moment of inertia. Lab work includes calculation of force and stress analysis in addition to material testing.

3 hours of lecture, 3 hours of lab per week — Prerequisite: PHY 1041
[Course fee: $15] — Corequisite: MAT 1520

CET 2050 Civil & Environmental Design (4) **spring**

This course provides experience with realistic civil engineering technology problems that require the use of knowledge and skills obtained in previous courses. Under faculty supervision, the student designs a project that could include site development plans; buildings and parking structures; bridges; water supply and treatment facilities; or roads and highways. The student develops graphic presentations, preliminary designs, calculations, and working drawings. The final phase of some projects may include estimating and construction scheduling.

2 hours of lecture, 6 hours of lab per week — Prerequisite: CET 2012, 2020
Corequisite: CET 2030, 2110, 2120

CET 2110 Mechanics of Soils (3) **spring**

This course covers the basic principles and applications of soil mechanics used in design and construction and introduces soil and its formation, actions, and uses. It includes studies of index properties; soil classification; exploration and sampling; compaction; soil strength; erosion control; foundations; and retaining walls. Problems relating to these items are presented and solved and the student prepares an individual technical report of each test performed.

2 hours of lecture, 3 hours lab per week — Prerequisite: CET 2040

CET 2120 Structural Design (3) **spring**

This course presents the design of structural systems, focusing on solid sawn wood and engineered wood products. Structural loads, general framing concepts, structural drawings, and (primarily) wood structural systems are presented. The design of various wood structural configurations such as tension members, beams, columns, and connections is covered in accordance with relevant design codes. Structural foundations are introduced. Lab work consists primarily of the application of building and design codes to the design and analysis of structural systems.

2 hours of lecture, 3 hours lab per week — Prerequisite: CET 2040
[Course fee: $15]

Chemistry (CHE)

CHE 1020 Introduction to Chemistry **(4)** **as required**

This survey course examines atomic structure; the periodic table; chemical reactions; gases; liquids; solids; chemical equilibrium; acids and bases; bonding; and molecular structure and introduces organic chemistry.

3 hours of lecture, 2 hours of lab per week
[Course fee: $10]

CHE 1031 General Chemistry I **(4)** **as required**

This course for the engineering student consists of the fundamentals of general and physical chemistry. Lab experiments reinforce concepts introduced in lectures; teach basic laboratory skills and techniques; and introduce some methods of analysis currently used in industry with emphasis on fundamental quantitation and analytical techniques.

3 hours of lecture, 3 hours of lab per week — Corequisite: MAT 1210 or higher
[Course fee: $10]

CHE 2060 Principles of Organic Chemistry (4) **spring**

This course enhances knowledge and skills in organic chemistry and includes a general overview of aliphatic compounds (hydrocarbons, alcohols, ethers, aldehydes, ketones, carboxylic acids, carbohydrates); cyclic compounds; and combinations of aliphatic and cyclic structures (including amino acids and nucleic acids). Important areas of organic chemistry are covered, including polymerization, hydrogenation, isomerization, photochemistry, and stereochemistry.

3 hours of lecture, 3 hours of lab per week — Prerequisite: CHE 1031
[Course fee: $10]

Computer Science (CIS)

CIS 1041 Computer Applications **(3)** **fall**

This course introduces information processing using the Windows operating system and application software designed for computers and mobile devices. The course covers file management, presentation graphics, word processing, and spreadsheets. Basic algebra skills are recommended.

3 hours of lecture per week

CIS 1042 Computer Applications II **(3)** **spring**

In this course, the student learns advanced information processing skills using the Windows operating system and common applications for business including word processing, spreadsheets, database management, presentation graphics, publishing, and digital image manipulation.

3 hours of lecture per week — Prerequisite: CIS 1041

***CIS 1050 Introduction to Spreadsheets* (1)** **fall/spring**
This course covers the concepts, knowledge, and skills necessary to design, create, organize, store, and utilize spreadsheets. The student explores concepts and skills such as user-made functions, translation to graphs, using library macros, user macro development, and what-if scenarios with hands-on real world settings. The successful student can generate and use spreadsheets to process information rapidly in virtually any setting and performs as a professional in the workplace.
1 hour of lab per week

CIS 1120 Introduction to Information Science & Technology (3) **fall**
This course introduces the student to the world of information science and technology across a broad range of topics including the history of computing, computing in society, career paths in computing, and the use of computers in the workplace.
3 hours of lecture per week

***CIS 1151 Website Development* (3)** **fall/spring**
This course introduces web pages for commercial websites including use of and design with Hypertext Markup Language (HTML), text, and graphics; applying appropriate design, color, and art; size and placement of graphics (including image maps) in a web page; creation of advanced tables (including nested tables); creation of forms that contain advanced input types and attributes, text areas, and advanced lists; and use of a validation tool to debug an HTML document.
2 hours of lecture, 2 hours of lab per week or 3 hours of online lecture per week

***CIS 1152 Advanced Website Development* (3)** **spring**
This course teaches the student implementation, monitoring, and deployment of a complete website and integration of the website with a database. Emphasis is on the PHP language and server side processing. JavaScript is used when it's suited to the desired task. Topics include authentication methods; form processing; form validation using HTML 5, JavaScript, and PHP; an overview of databases; PHP functions to interface with a database; and website security.
2 hours of lecture, 2 hours of lab per week Prerequisite: CIS 1151

CIS 2010 Computer Organization (4) **spring**
In this course, the student gains a basic understanding of computer hardware through introduction to binary data representation, pointers, and memory through the C programming language. This knowledge expands to include the functioning of the CPU including registers, ALU, and simple I/O and culminates in an introduction to assembly language.
3 hours of lecture, 2 hours of lab per week Prerequisite: CIS 2025 or 2262 or 2271 with a *C*- or better
Corequisite: CIS 1120 or MAT 2120

CIS 2025 C Programming (3) **fall/spring**
This course teaches the student to write programs using the C language. All fundamental features of C are covered including arrays, functions, pointers, file I/O, string manipulation, and preprocessor directives. The course emphasizes good software design techniques, programming style, and documentation. No prior programming experience is required.
2 hours of lecture, 2 hours of lab per week
[Course fee: $75]

CIS 2151 Computer Networks I (4) **spring**
This course introduces the student to network protocols and covers physical, data link, network, transport, and application layer protocols. The TCP/IP protocol suite is discussed in detail. Topics include Ethernet, connectionless protocols, connection-oriented protocols, and application protocols such as DNS, DHCP, and HTTP. The student learns about both hardware and software troubleshooting tools, security issues, and current topics such as IPv6. Hands-on experience with networking equipment and use of network simulation tools are used throughout the course.
3 hours of lecture, 2 hours of lab per week

***CIS 2230 System Administration* (4)** **fall**
This course explores the basics of system management. It provides the student with enough theory to understand how operating systems work and to interpret the output of various management tools. It also covers practical issues in system administration including process, memory, and file system monitoring and performance tuning. Computer security is also discussed.
3 hours of lecture, 2 hours of lab per week Prerequisite: CIS 2025 or 2262 or 2271 with a *C*- or better

***CIS 2235 Advanced System Administration* (4)** **spring**
This course focuses on management tasks and considerations for enterprise-level information technology systems. Topics include network infrastructure components, security devices, VoIP systems, service delivery systems, and system management applications.
3 hours of lecture, 2 hours of lab per week Prerequisite: CIS 2151, 2230

CIS 2260 Object-Oriented Programming (3) **fall**
This course introduces the student to the use of strong specifications and abstract data types in object-oriented programming as well as the basics of object-oriented design.
3 hours of lecture per week Prerequisite: CIS 2262 or 2271 with a *C*- or better

CIS 2261 Introduction to Java Programming I (4) **fall**
This is the first of two courses that introduce the basic concepts and techniques of Java. Essential topics include program structure; primitive and string data types; operators; expressions; control structures; static methods; and classes and objects.
3 hours of lecture, 2 hours of lab per week

CIS 2262 Introduction to Java Programming II (3) **spring**
This course is a continuation of CIS 2261 and covers additional concepts in object-oriented programming such as inheritance and polymorphism; exceptions and exception handling; the Java collections framework (lists, sets, maps, and iterators); creating and using packages; and creating graphical user interfaces.
3 hours of lecture per week Prerequisite: CIS 2261

***CIS 2271 Java Programming* (4)** **fall**
This course introduces the basic concepts and techniques of Java, including object-oriented programming (OOP). Essential topics include program structure; primitive and string data types; operators; expressions; control structures; static methods (including an introduction to recursion); exception handling; use of library packages; and top-down design. OOP concepts include classes and objects; instance methods and constructors; inheritance; polymorphism; and an introduction to object-oriented design. The course also covers the basics of graphical user interface construction.
3 hours of lecture, 2 hours of lab per week

CIS 2320 Software Quality Assurance & Testing (3) **fall**
This course introduces the concepts, techniques, and tools used for evaluating and ensuring the quality of computer software. Topics include dimensions and implications of quality, code reviews, test construction, test coverage metrics, partition testing, website testing, and current test support tools, including issue tracking systems.
3 hours of lecture per week Prerequisite: CIS 2025 or 2262 or 2271 with a *C-* or better

CIS 2450 Advanced Web Technologies (3) **spring**
This course introduces advanced use of web technologies methods and practices. Discussion includes the use of technologies such as JavaScript, jQuery, CSS preprocessors, web APIs, and major web development frameworks which are all implemented in the lab.
2 hours of lecture, 2 hours of lab per week Prerequisite: CIS 1151

CIS 2730 Software Engineering Projects (3) **spring**
This capstone course involves the development of a group project. The development effort is combined with an introduction to systems development and life cycle. The student receives an introduction to oral presentations of technical information to a technical audience.
2 hours of lecture, 2 hours of lab per week Prerequisite: CIS 2025 or 2262 or 2271 with a *C-* or better

CIS 3010 Database Systems (4) **spring**
This course covers methods for designing relational databases; the use of SQL to define and access a database; and the use of production-level database management systems to implement a relational database system. The student completes a project in which they either implement a real-world example relational database or research a specific database topic not covered during class. Additional topics that may be discussed include integrating databases into applications or websites; alternative database paradigms; database design/engineering tools; and underlying implementation of databases.
3 hours of lecture, 2 hours of lab per week Prerequisite: CIS 1151; CIS 2262 or 2271 with a *C-* or better

CIS 3012 C++ Programming (3) **spring**
This course covers the syntax and semantics of the major C++ features. Topics include data abstraction, object-oriented programming, and generic programming, including the use of the standard template library. C++ 2011 is used and features added to that standard are described. Discussion of C++ best practices and design techniques is incorporated throughout.
3 hours of lecture per week Prerequisite: CIS 2010 or 2025; CIS 2260

CIS 3030 Programming Languages (3) **fall**
This course covers fundamental concepts in programming language design from the perspective of the practical programmer. Topics include the syntactic representation of programs; functional programming; static vs. dynamic programming languages; selected advanced object oriented topics; and an introduction to the theory of computation as it applies to programming languages. The student gains useful experience with at least two new languages: one the focus of the instructor and one chosen by the student for a project.
3 hours of lecture per week Prerequisite: CIS 2260
Corequisite: CIS 3050

***CIS 3050 Algorithms & Data Structures* (3)** **fall**
This course focuses primarily on the implementation of various important algorithms and data structures. It contains some theory, but the theory content is minimized in favor of a more rigorous treatment of implementation techniques. The course covers classic topics such as lists, trees, hash tables, graphs, sorting, and string matching. Other topics such as encryption, data compression, and image processing are covered as time allows.
3 hours of lecture per week Prerequisite: CIS 2010; CIS 2025 or 2260

CIS 3152 Network Programming (3) **as required**
This course includes topics such as client/server programming with sockets for TCP and UDP; programming at least one application level protocol such as HTTP or SMTP/MIME; an introduction to character sets; and at least one remote procedure call system (ONC RPC, Ice, etc.) An introduction to XML and the use of XML libraries is also presented. Proper error handling techniques are discussed throughout.
3 hours of lecture per week Prerequisite: CIS 2151; CIS 2010 or 2025; CIS 2262 or 2271

CIS 3170 The History of Computation (3) **fall**
In this course, the student learns the principles of early computational devices and investigates how the concepts inherent in these devices are implemented in modern computers. Particular attention is focused on Boolean logic, Frege formula language, flow charts, state machines, and Turing machines. The implications of Shannon's law and Moore's law are presented.
3 hours of lecture per week

CIS 3210 Network Routing & Switching Concepts (4) **fall**
This course teaches the operation and configuration of routers and switches in a network architecture. Concepts such as virtual LAN (VLAN) configurations; routing concepts; inter-VLAN routing; static routing; introduction to OSPF; access control lists and implementation; and configuration of DHCP and NAT in a network configuration are covered along with IPv4 and IPv6 concepts.
3 hours of lecture, 2 hours of lab per week Prerequisite: CIS 2151

CIS 3250 Advanced Network Architectures (4) **fall**
In this course, the student implements, monitors, deploys, and maintains a network in a converged enterprise environment. It covers the secure integration of VLANs, WLANs, security, and video into networks and network implementations such as HSRP, STP, EtherChannel, wireless technologies, advanced OSPF, EIGRP, and frame relay. The student plans, configures, and verifies the implementation of complex enterprise switching solutions.
3 hours of lecture, 2 hours of lab per week Prerequisite: CIS 2151

CIS 3272 Advanced Java **(3)** **as required**
This course covers the more advanced languages features and libraries available in Java.
3 hours of lecture per week Prerequisite: CIS 2260

CIS 3310 Artificial Intelligence (3) **as required**
This course examines the algorithms and data structures used in artificial intelligence and programs as a range of approaches that computers use to emulate intelligence: planning, knowledge representation, learning, decision-making, and game-playing.
3 hours of lecture per week Prerequisite: CIS 3050

CIS 4011 Information Warfare (3) **spring**
This course is a strategic level examination of the use of the information instrument of national power. Topics covered include cyberspace operations, computer network operations, information operations, military strategy, and civil military relations.
3 hours of lecture per week Prerequisite: CIS 2151, 2230

CIS 4020 Operating Systems (4) **fall**
This course examines the internal workings of modern operating systems. Topics include multiprocessing, memory management, file systems, device drivers, distributed operating systems, and real time operating systems. The student writes a kernel module or a device driver for an operating system chosen by the instructor.
3 hours of lecture, 2 hours of lab per week Prerequisite: CIS 3050

CIS 4040 Computer Security **(3)** **fall**
This course focuses on security issues associated with computers and computer networks. Topics include cryptography (symmetric and public key cryptography, digital signatures, secure hashes, random number generation, and message authentication codes); network security (secure protocols [SSL/TLS, IPsec], network attack methods, network authentication protocols [Kerberos], and firewalls); and host security (building secure software, auditing, and intrusion detection).
3 hours of lecture per week Prerequisite: CIS 2151, 2230; CIS 2025 or 2262 or 2271 with a *C-* or better

CIS 4050 Compiler Design (3) **spring**
This course familiarizes the student with how computer languages are implemented. They write a small compiler for a simplified programming language using compiler construction tools such as lexical analyzer generators and parser generators as well as creating some hand-built components. Although some theory is presented, emphasis is on implementation. Programming is done in C or Java.
3 hours of lecture per week Prerequisite: CIS 3030, 3050

CIS 4080 Network Security (3) **as required**
In this course, the student learns to implement, monitor, deploy, and maintain a secure network; implement on Cisco routers (AAA, IP-sec, secure Layer 2 technologies); implement firewall technologies; IDS and IPS fundamentals; and mitigation technologies for email, web-based, and endpoint threats. Comprehensive assignments using the Cisco Packet Tracer network simulator emphasize hands-on learning.
3 hours of lecture per week Prerequisite: CIS 2151

***CIS 4120 Systems Analysis & Design* (3)** **spring**

This course advances the student's skills to develop, refine, and communicate requirements and designs related to computer systems. This course is reading- and writing-intensive.

3 hours of lecture per week

CIS 4140 Human Computer Interaction (3) **as required**

This course covers the design, implementation, and evaluation of user interfaces for computers and other modern, complex electronic equipment.

3 hours of lecture per week Prerequisite: CIS 1152 or 2260

CIS 4150 Software Engineering (3) **fall**

This course covers the product life cycle for a software product. Topics include common current practices in a variety of industrial settings as well as more recent leading-edge advances.

3 hours of lecture per week

CIS 4210 Computer Graphics (3) **as required**

This course deals with the computer generation of realistic images of 2- and 3-dimensional scenes and involves substantial computer programing.

3 hours of lecture per week Prerequisite: CIS 3050; MAT 1520

CIS 4220 Physical Simulations (3) **as required**

This course combines numerical programming techniques with Newtonian physics and calculus to give the student an understanding of how physical systems can be simulated on a computer. Topics include the simulation of rigid bodies, soft bodies, fluids, and collision detection. This course emphasizes applications rather than mathematical theory and involves a significant amount of programming.

3 hours of lecture per week Prerequisite: CIS 2025, 2262, or 2271 with a *C-* or better ;MAT 1520; PHY 1041

CIS 4230 Parallel Programming (3) **as required**

This course examines the applications, algorithms, construction, configuration, and performance of parallel programs. Topics include shared memory parallelism using POSIX threads and OpenMP and multi-machine parallelism using MPI. Parallel programming on modern GPU devices is introduced.

3 hours of lecture per week Prerequisite: CIS 2230, 3050

CIS 4240 Ethical Hacking & Network Defense (3) **fall**

This course teaches the student to protect systems from common hacker attacks using both Windows and Linux systems. The student learns legal restrictions and guidelines and abides by them. They perform hands-on exercises which emphasize and enforce skills such as attacking and defending; using port scans; footprinting; exploiting Windows and Linux vulnerabilities; buffer overflow exploits; SQL injection; privilege escalation; MAC spoofing; and backdoor attacks.

3 hours of lecture per week Prerequisite: CIS 2151

CIS 4241 Advanced Ethical Hacking (3) **as required**

This course explores advanced cybertechnology threats and tactics and covers the employment of advanced tactics in the context of a penetration test. Topics include planning, web threats, mobile threats, wireless hacking, protocol abuse, malware creation, social engineering, and evasion of defensive tools.

3 hours of lecture per week Prerequisite: CIS 4240

CIS 4250 Big Data Processing (3) **as required**

This course describes techniques for processing very large data sets that are typically stored across multiple machines in a cluster. It's primarily a programming course, although some topics in cluster administration and configuration are also discussed. Technologies covered include Hadoop (MapReduce), Apache Spark, Apache Kafka, and other specialized technologies as time allows (e.g., Pig). Fluency with Java is required; experience with Scala is helpful but not essential.

3 hours of lecture per week Prerequisite: CIS 2230, 3030

CIS 4310 Computer Forensics (3) **fall**

This class introduces digital forensic methods, practices, technology, and legal concerns. The student considers issues of incident response and handling, data collection, chain of evidence, data analysis, cryptanalysis, steganography, and report writing.

3 hours of lecture per week Prerequisite: CIS 2151, 2230

CIS 4320 Machine Learning (3) **as required**

In this course, the student learns the algorithms, tools and techniques used in modern machine learning applications. Approaches covered include regressions; decision trees and forests of trees; nearest neighbor; and ANNs, CNNs, RNNs, GANs and SVMs. The entire ML life cycle is considered, ranging from exploratory data analysis, data preparation, and proper evaluation of learned models.

3 hours of lecture per week Prerequisite: CIS 3050

CIS 4721 CIS Senior Project I (2) **fall**

The course is largely a self-directed senior project in which the student demonstrates mastery of the subjects covered in their program. This first part of a two-part course sequence, this first term involves defining the eventual project and learning necessary technologies.

1 hours of lecture, 2 hours of lab per week

CIS 4722 CIS Senior Project II (3) **fall/spring**
This course completes the senior project from CIS 4721 and culminates in a public presentation of the project.
1 hour of lecture, 4 hours of lab per week Prerequisite: CIS 4721

CIS 5020 Advanced Operating Systems (4) **fall**
This course examines the internal workings of modern operating systems. Topics include multiprocessing, memory management, file systems, device drivers, distributed operating systems, and real time operating systems. The student writes a kernel module or a device driver for an operating system chosen by the instructor.
3 hours of lecture, 2 hours of lab per week

CIS 5050 Advanced Data Structures & Algorithms (3) **as required**
This course prepares the graduate student to understand, implement, and analyze sophisticated algorithms and data structures.
3 hours of lecture per week Prerequisite: CIS 3050

CIS 5080 Advanced Network Security (3) **fall**
In this course, the student learns to implement, monitor, deploy, and maintain a secure network; implement on Cisco routers (AAA, IP-sec, secure Layer 2 technologies); implement firewall technologies; IDS and IPS fundamentals; and mitigation technologies for email, web-based, and endpoint threats. Comprehensive assignments using the Cisco Packet Tracer network simulator emphasize hands-on learning.
3 hours of lecture per week Prerequisite: CIS 2151

CIS 5120 Advanced Systems Analysis & Design **(3)** **spring**
This course advances the student's skills to develop, refine, and communicate requirements and designs as related to computer systems. This course is reading- and writing-intensive.
3 hours of lecture per week

CIS 5130 Analysis of Software Artifacts (3) **fall**
In this course, the student analyzes the range of artifacts created during the software development process, ranging from requirements and design documents through source code and test results. The approaches covered include both heuristic and formal analyses.
3 hours of lecture per week Prerequisite: CIS 4050, 4120, 4150

CIS 5140 Software Architecture (3) **spring**
This course is a detailed consideration of software design from the high-level perspective. The student examines a range of distinct architectural styles, considering their appropriateness for a range of problems.
3 hours of lecture per week Prerequisite: CIS 4120, 4150

CIS 5150 Advanced Software Engineering (3) **fall**
This course covers the product life cycle for a software product. Topics include common current practices in a variety of industrial settings as well as more recent leading-edge advances.
3 hours of lecture per week

CIS 5210 Advanced Computer Graphics (3) **as required**
This course deals with the computer generation of realistic images of 2- and 3-dimensional scenes and involves substantial computer programing.
3 hours of lecture per week Prerequisite: CIS 3050; MAT 1520

CIS 5220 Advanced Physical Simulations (3) **as required**
This course combines numerical programming techniques with Newtonian physics and calculus to give the student an understanding of how physical systems can be simulated on a computer. Topics include the simulation of rigid bodies, soft bodies, fluids, and collision detection. This course emphasizes applications rather than mathematical theory and involves a significant amount of programming.
3 hours of lecture per week Prerequisite: CIS 2025 or 2262 or 2271 with a *C-* or better; MAT 1520; PHY 1041

CIS 5230 Advanced Parallel Programming (3) **spring**
This course examines the applications, algorithms, construction, configuration, and performance of parallel programs. Topics include shared memory parallelism using POSIX threads and OpenMP and multi-machine parallelism using MPI. Parallel programming on modern GPU devices is introduced.
3 hours of lecture per week Prerequisite: CIS 2230, 3050

CIS 5250 Advanced Big Data Processing (3) **as required**
This course describes techniques for processing very large data sets that are typically stored across multiple machines in a cluster. It's primarily a programming course, although some topics in cluster administration and configuration are also discussed. Technologies covered include Hadoop (MapReduce), Apache Spark, Apache Kafka, and other specialized technologies as time allows (e.g. Pig). Fluency with Java is required; experience with Scala is helpful but not essential.
3 hours of lecture per week Prerequisite: CIS 2230, 3030

CIS 5320 Advanced Machine Learning (3) **as required**
In this course, the student learns the algorithms, tools and techniques used in modern machine learning applications. Approaches covered include regressions; decision trees and forests of trees; nearest neighbor; and ANNs, CNNs, RNNs, GANs and SVMs. The entire ML life cycle is considered, ranging from exploratory

data analysis, data preparation, and proper evaluation of learned models.
3 hours of lecture per week Prerequisite: CIS 3050

CIS 6050 Advanced Compiler Design (3) spring
This course familiarizes the student with how computer languages are implemented. They write a small compiler for a simplified programming language using compiler construction tools such as lexical analyzer generators and parser generators as well as creating some hand-built components. Although some theory is presented, emphasis is on implementation. Programming is done in C or Java.
3 hours of lecture per week Prerequisite: CIS 3030, 3050

CIS 6140 Advanced Human Computer Interaction (3) as required
This course covers the design, implementation, and evaluation of user interfaces for computers and other modern, complex electronic equipment.
3 hours of lecture per week Prerequisite: CIS 1152 or 2260

CIS 6721 Master's Project (1) as required
This course supports a significant practical individual or small group project taken to completion and then presented to the community.
1 hour of independent study per week

CIS 6740 Graduate Seminar I (1) fall
This is a paper-reading and discussion course in which the instructor chooses a selection of papers appropriate to the class members.
1 hour of seminar per week

CIS 6741 Graduate Seminar II (1) spring
This is a paper-reading and discussion course and each student is responsible for choosing at least one paper and leading a discussion on that paper.
1 hour of seminar per week Prerequisite: CIS 6740

Construction Management (CPM)

CPM 1000 CM Freshman Seminar (1) fall
This course facilitates a successful transition to college and focuses on orientation to college and academic success strategies. Topics include student rights and responsibilities; grading and graduation requirements; information technology and database orientation; campus resources; time management; note taking; introduction to career opportunities; and program-specific topics including construction program issues, the building construction industry, and professional development. Pass/No Pass.
1 hour of seminar per week

CPM 1010 Electrical/Mechanical Systems (3) spring
In this course, the student is introduced to the major environmental systems in a building: electrical and illumination; heating, cooling, and ventilation; and plumbing. It includes an introduction to the influence of the natural environment on the built environment and a consideration for how these effect energy use and conservation. Focus is on the building codes that govern the design of the various environmental systems.
2 hours of lecture, 3 hours of lab per week Prerequisite: CPM 1021, 1031

CPM 1021 Construction Graphics I (2) fall
This course prepares the student to interpret construction drawings by teaching them to create basic architectural drawings by hand. They learn to draw plans, elevations, sections, and details and understand how they relate to each other. Informal sketching techniques are practiced and used throughout. Spreadsheets are introduced with applications appropriate to construction including calculations, quantities, and estimates.
1 hour of lecture, 2 hours of lab per week

CPM 1022 Construction Graphics II (2) spring
This course is a continuation of CPM 1021 in which the student reads blueprints residential and commercial construction plans using classroom instruction, drawing of print details, and plan-reading exercises. They perform basic material takeoff techniques used in estimating and apply CAD basic 2D mechanical drafting techniques to drawing plans and design details.
1 hour of lecture, 2 hours of lab per week Prerequisite: CPM 1021

CPM 1031 Residential Construction Systems (3) fall
In this course, the student examines residential construction methods and materials; wood frame construction of floors, walls, and roofs; structural soils; and an introduction to concrete foundations. Topics include stairs, roof rafters, and an introduction to estimating, building codes material takeoff, and structural loads.
3 hours of lecture per week Corequisite: CPM 1032

CPM 1032 Construction Lab (2) fall
This course introduces the student to construction materials and methods, tools, and safety. They work on small building projects and mock ups to learn material placement, concrete work, carpentry, siding, and roofing techniques in jobsite conditions.
6 hours of lab per week Corequisite: CPM 1031

CPM 1111 Commercial Construction Systems (4) **spring**

This course introduces the student to the construction materials and installation methods used in commercial projects. They study soils and foundation types; heavy timber frame construction; masonry, concrete, and steel construction systems; and commercial roofing, insulation, and cladding systems as well as the International Building Code.

4 hours of lecture per week Prerequisite: ARE 1210 or CPM 1031

CPM 2010 Construction Estimates I (3) **fall**

This course introduces the estimating principles and procedures used to determine detailed cost estimates for construction bidding purposes. Both residential and light commercial applications are addressed. Topics include organizing an estimate; methods of pricing labor, materials, and equipment; direct and indirect overhead costs; units of measure; computer spreadsheets; and profit; an introduction to contracts and types of bids; and computer estimating software applications.

2 hours of lecture, 3 hours of lab per week Prerequisite: CPM 1111 or LAH 1020; MAT 1210, 1311, 1312, or 1520

CPM 2020 Construction Project Management (3) **fall**

This course covers the principles of construction project management: design and construction processes; contract documents; organization of the construction firm; subcontractor relationships; records and reports; cost control methods and procedures; schedule control; construction safety; quality control; bar chart; critical path method scheduling; and an introduction to design-build and construction manager contracting.

3 hours of lecture per week

CPM 2030 Elementary Theory of Structures (4) **spring**

This course introduces the student to preliminary analysis of the structural design of building components and frames and serves as an introduction to statics and strength of materials, including properties of materials used in residential and commercial construction. It is an in-depth study of building static loads referencing concrete, steel, wood, and pre-engineered wood products.

3 hours of lecture, 3 hours of lab per week Prerequisite: CPM 1111; MAT 1210 or 1311; PHY 1030

CPM 2050 Construction Management Software (1) **fall**

This course exposes the student to the software used in construction management, particularly spreadsheets and scheduling. Direct instruction is provided by working through tutorial exercises and creating functional spreadsheets and project schedules.

2 hours of lab per week Prerequisite: CPM 1022

CPM 2060 Field Engineering (3) **fall**

This course introduces the student to the fundamentals of construction field engineering, survey, and building layout. They learn the use and care of survey equipment while performing field practices such as distance measuring; building layout; profile and cross-sectional leveling; and traversing. Trigonometry and geometry are used to balance angles, make distance corrections, and compute areas and volumes.

2 hours of lecture, 3 hours of lab per week Prerequisite: MAT 1210 or 1311

[Course fee: $25]

CPM 2730 Construction Seminar & Project (3) **spring**

This seminar weaves prior coursework into workplace-ready application. The student reads and interprets contracts and specifications for commercial projects of significant scope and develops an estimate of construction time, a project schedule, a schedule of values, and a safety plan through individual and group work.

2 hours of lecture, 3 hours of lab per week

CPM 2802 Construction Internship Review (1) **fall**

This course is a review of the summer internship. Pass/No Pass.

1 hour of seminar per week

[Course fee: $250]

CPM 3010 Construction Estimates II (3) **spring**

This course provides an advanced understanding of the theory and practice of construction estimates. Industry projects and case studies demonstrate advanced estimating concepts and processes. Estimating means and methods of a broad range of construction projects, Building Information Modeling, quality takeoff, and estimating software are included.

2 hours of lecture, 2 hours of lab per week Prerequisite: CPM 2010

CPM 3020 Construction Documents (3) **spring**

This course covers analysis, creation, and organization of construction documents. The student conducts takeoffs and divisional cost controls; creates and tracks submittals; shops drawings; makes requests for information and proposals; interprets specifications, contracts, and architectural, civil, and structural drawings; and interprets LEED, International Building Code, and local zoning and life safety requirements.

3 hours of lecture per week Prerequisite: CPM 2020, 2730

CPM 3030 Concrete & Steel Lab (2) **spring**

This course prepares the student for the American Concrete Institute's Field 1 Concrete Certificate. They interoperate soil sieve analysis relative to concrete characteristics and examine concrete batch and strength. Methods of testing are practiced through lab experience and analytical reporting. The student works with

structural and thin-walled steel.
1 hour of lecture, 2 hours of lab per week Prerequisite: CPM 1111
[Course fee: $150]

CPM 3130 Construction Soils (3) fall
In this course, the student develops a basic understanding of soils in construction and engineering industries. It stresses the applied aspects of soil as a building material and as a medium in other industries such as wastewater design, wetlands, and hazardous waste spills and focuses on hands-on familiarity with soils, soil characteristics, maps, tools, and resources with some technical writing. Topics include excavation; grading; soil investigation techniques; erosion prevention and control; compaction; and foundations in addition to soil basics of texture, structure, soil formation, soil water movement, and soil classification.
2 hours of lecture, 3 hours of lab per week Prerequisite: MAT 1210 or placement level 2

CPM 4010 Contract Negotiations (3) fall
This course is based on a series of simulated negotiations in a variety of contexts including one-on-one, multi-party, third-party, and team negotiations. It improves the student's skills in all phases of negotiations: understanding negotiation theory as it applies to single and multi-party negotiations; buyer-seller transactions and the resolution of disputes; development of negotiation strategy; and the management of integrative and distributive aspects of the negotiation process.
3 hours of lecture per week Prerequisite: CPM 2020, 2730
[Course fee: $60]

CPM 4030 Construction Safety & Risk Management (3) fall
This course studies safety problems in the construction and manufacturing environment with emphasis on the day-to-day activities of the construction safety coordinator. Ethical, moral, productivity, and monetary implications of the practices of safety are considered and it culminates in the creation of a workplace safety plan.
3 hours of lecture per week

CPM 4040 Construction Scheduling (3) fall
This course explores time management of construction projects. Topics include project scheduling; durations and dependencies; efficiency calculations; critical path method; and cost control models. Industry examples and case studies demonstrate resource allocation, dispute resolution, and productivity. Computer applications for construction scheduling are used to create Gantt charts, network diagrams, and progress reports.
2 hours of lecture, 2 hours of lab per week Prerequisite: CPM 2020, 2730, 3010; CPM 2802 or 4802

CPM 4120 Project Planning & Finance (3) spring
This course uses computerized construction management and accounting software to examine issues in project planning and financial management, along with running a successful construction company. The student learns markups; margins; pricing; fixed and variable costs; and cost controls.
3 hours of lecture per week Prerequisite: ACC 1020; BUS 3230

CPM 4130 Construction Superintendency (3) spring
This course covers the duties and responsibilities of on-site construction leaders with emphasis on the procedures, methods, and administration documentation system used by construction contractors during construction and post-construction phases of a project. Quality control and reporting and motivational and leadership concepts are discussed as they apply to construction.
3 hours of lecture per week

CPM 4140 Construction Contracts (3) spring
This course provides an in-depth study of the role of contracts in the construction industry with a focus on the different contractual terms and how those terms control risk allocation and the relationships between parties. It examines legal considerations of standardized construction contracts. The student develops skills in analyzing contracts with an emphasis on dispute prevention.
3 hours of lecture per week Prerequisite: BUS 2440; CPM 3020

CPM 4730 Preconstruction Services (3) fall
This course focuses on the development of comprehensive preconstruction proposals for horizontal and vertical construction. It includes presentation skills and practice to tailor detailed cost analyses, schedules, labor requirements, and methods of construction for multiple construction projects.
3 hours of lecture per week
[Course fee: $200]

CPM 4802 CM Senior Summer Internship Review (1) fall
This course reviews and evaluates the effectiveness of an internship experience and quantifies learning outcomes as they pertain to the major and to the construction practices career field. Pass/No Pass.
1 hour of seminar per week
[Course fee: $250]

Dental Hygiene (DHY)

DHY 1011 Pre-clinical Dental Hygiene (5) fall
This course provides an introduction to the didactic and clinical framework necessary to the practice of dental hygiene. The didactic component consists of learning units covering preventive dental hygiene the-

ory. The primary emphasis of the clinical component is on learning the techniques of basic dental hygiene instrumentation. The student begins to integrate knowledge of theory and practice through simulated patient experiences on manikins and student partners.

3 hours of lecture, 6 hours of lab per week — Corequisite: DHY 1021
[Course fee: $1,325]

DHY 1012 Clinical Dental Hygiene I (5) — **spring**

This course is a continuation of DHY 1011 with emphasis on the clinical component of dental hygiene practice. The student integrates knowledge of dental hygiene theory and practice by providing dental hygiene care to consumer patients during the second half of the term. The didactic and clinical components of this course challenge the student to develop problem-solving and critical-thinking skills.

2 hours of lecture, 8 hours of lab per week — Prerequisite: DHY 1021
[Course fee: $675] — Corequisite: DHY 1022

DHY 1021 Oral Tissues I (3) — **fall**

This course introduces the student to the common terms used in dental hygiene; the anatomy of the teeth and oral structures; and identification of primary and permanent teeth. It includes an introduction to general histology and embryology with emphasis on the microscopic structures of enamel, dentin, pulp, cementum, periodontal ligament, alveolar bone, gingiva, oral mucosa, and the tongue.

2 hours of lecture, 2.5 hours of activity per week — Corequisite: DHY 1011

DHY 1022 Oral Tissues II & Medical Emergencies (3) — **spring**

This course prepares the student to prevent and manage life-threatening medical emergencies in dental practice with emphasis on reducing the likelihood of life-threatening emergencies; recognizing early warning signs and symptoms; implementing appropriate measures for prevention; and proper management of medical emergencies. It presents basic cell histology, salivary gland histology, and paranasal sinuses and skeletal, muscular, cardiovascular, lymphatic, and nervous systems as they relate to the head and neck. The embryologic development of the face, palate, tongue, and odontogenesis are covered in detail.

2 hours of lecture, 2 hours of activity per week — Prerequisite: DHY 1021
Corequisite: DHY 1012

DHY 1030 Dental Radiology (3) — **fall**

Dental Radiology is the study, demonstration, and practice of the fundamentals of dental x-ray production and intraoral and extra-oral radiographic techniques utilizing digital imaging. The student learns to recognize the radiographic appearance of normal anatomical structures and common oral disorders.

2 hours of lecture, 2 hours of lab per week — Prerequisite: DHY 1022
[Course fee: $75] — Corequisite: DHY 2721

DHY 2010 Dental Materials (3) — **spring**

This course emphasizes the clinical and theoretical concepts of dental materials and their clinical application and addresses the fundamental concepts of modern chemistry as they relate to the manipulation and use of dental materials. The study of dental materials and their properties provides the student with knowledge of oral health and disease as a basis for assuming the responsibility of assessment, planning, and implementation of preventive and therapeutic services in dental hygiene practice.

2 hours of lecture, 2 hours of lab per week — Prerequisite: DHY 2721
[Course fee: $25] — Corequisite: DHY 2722

DHY 2020 General Pathology & Clinical Dental Pharmacology (3) — **spring**

This course introduces clinical pathology and pharmacological management in the treatment of dental patients. The student learns to integrate medical diseases commonly found in dental hygiene clinical practice with the pharmacological agents used in the management of those diseases.

3 hours of lecture per week — Prerequisite: BIO 2120; DHY 1030, 2721
Corequisite: DHY 2722

DHY 2030 Periodontics (3) — **fall**

This course guides the student toward an in-depth understanding of the recognition, progression, and treatment of periodontal diseases. Since the dental hygienist provides direct communication to patients regarding education, prevention, and control of both periodontal diseases and dental caries, they must possess sufficiently detailed knowledge to assist patients to better understand their specific dental condition. Insufficient, inadequate, or faulty understanding on the part of the hygienist regularly shows itself in varying degrees of unsuccessful prevention and incomplete care for patients.

3 hours of lecture per week — Prerequisite: DHY 1022
Corequisite: DHY 1030, 2721

DHY 2210 Community Oral Health I (2) — **fall**

This course introduces the concepts of community oral health with emphasis on advanced research designs, community health issues, and the function of public health programs. It also introduces sociological study with emphasis on core models and concepts associated with dominant sociological perspectives.

2 hours of lecture per week — Prerequisite: DHY 2722
Corequisite: DHY 3821

DHY 2211 Community Oral Health II (1) **spring**

The student uses knowledge gained in DHY 2210 to plan, implement, and evaluate a term-long community outreach project.

1 hour of lecture per week — Prerequisite: DHY 2210, 3821; Corequisite: DHY 2220, 3822

DHY 2220 Oral Pathology (3) **spring**

This course integrates knowledge gained from general pathology and basic anatomical, physiological, and dental sciences with concepts of diseases with emphasis on the etiology, histopathology, and treatment of specific oral diseases; the importance of a comprehensive medical and dental history; recognition of clinical signs and symptoms of oral pathology; and the process of formulating a differential diagnosis of oral lesions based on this information. It highlights oral neoplasia, pulpal pathology, temporomandibular joint disorder, microbial diseases, and selected systemic diseases.

3 hours of lecture per week — Prerequisite: DHY 3821; Corequisite: DHY 3822

DHY 2721 Clinical Dental Hygiene II (4) **fall**

The didactic portion of this course blends lectures with group discussions to stimulate interest in current clinical situations, theories, and concepts. Emphasis is on the clinical care of special populations, adjunct therapies, and expanding the student's dental hygiene knowledge base.

1.5 hours of lecture, 8 hours of clinic per week — Prerequisite: DHY 1012, 1022
[Course fee: $1,925] — Corequisite: DHY 1030, 2030

DHY 2722 Clinical Dental Hygiene III (4) **spring**

This course is a continuation of DHY 2721 and involves clinical practice with patients from Class 0 to Class 5 periodontal conditions. Children, adults, and special populations are treated and administration of local anesthetics is included.

1.5 hours of lecture, 8 hours of clinic per week — Prerequisite: DHY 2030, 2721
[Course fee: $250] — Corequisite: DHY 2010, 2020

DHY 3010 Evidence-Based Decision-Making in Dental Hygiene (3) **fall**

This course provides fundamental knowledge about evidence-based decision-making in dental hygiene and provides tools and skills needed to locate and review research articles and abstracts quickly and easily so that the student can interpret the literature to provide the best possible patient care and achieve optimum outcomes for patients.

3 hours of online lecture per week

DHY 3015 Contemporary Issues in Dental Hygiene (3) **fall**

This course examines current societal and professional issues and their impact on practice. The student examines the role of the dental hygienist in increasing access to dental care; researches and compares traditional and alternative practice models; and proposes changes to the healthcare system to improve delivery. It also discusses changing technology in dentistry and dental hygiene; political advocacy; demographic shifts; ethics and professionalism; interprofessional education; and global perspectives of dental hygiene.

3 hours of online lecture per week

DHY 3020 Advanced Periodontics (3) **spring**

This course expands upon the student's existing knowledge of current concepts in periodontology including etiology; associated risk factors; periodontal medicine; assessment; treatment planning; implementation and evaluation of contemporary treatment modalities; and maintenance therapy. The interrelationship of periodontal treatment with other dental specialties is discussed along with an investigation of the periodontal literature. Emphasis is on the dental hygienist's role in periodontal therapy.

3 hours of online lecture per week — Prerequisite: DHY 2030, 3010

DHY 3030 Dental Hygiene Methodology & Leadership (3) **spring**

This course is designed to provide an introduction to educational concepts and theory relative to dental hygiene education as well as theories, concepts, and principles of leadership that can be applied in the dental hygiene educational and clinical settings. Topics include leadership theories; educational unit lesson plan development and design; goals and objectives; learning styles and motivation; principles of learning; and classroom instruction using educational media and software.

3 hours of online lecture per week — Prerequisite: DHY 3822; Corequisite: DHY 3010

DHY 3821 Clinical Dental Hygiene IV (6) **fall**

This course is a continuation of DHY 2722.

1.5 hours of lecture, 12 hours of clinic per week — Prerequisite: DHY 2722
[Course fee: $1,725] — Corequisite: DHY 2210

DHY 3822 Clinical Dental Hygiene V (6) **spring**

This course is a continuation of DHY 3821.

1.5 hours of lecture, 12 hours of clinic per week — Prerequisite: DHY 3821
[Course fee: $525] — Corequisite: DHY 2220

DHY 4010 Advanced Community Oral Health (3) **fall**
This course provides a comprehensive introduction to evidence-based public health practices through the study and evaluation of existing public health programs with emphasis on the role of evidence-based research as the key to the startup and maintenance of successful dental public health programs. The various components of this course aim to stimulate interaction among learners around important problems and issues facing public health with a focus on community oral health practices.
3 hours of online lecture per week Prerequisite: DHY 3010

DHY 4213 Practice Management (3) **spring**
This course enhances the student's ability to provide optimum care while functioning within an interdisciplinary dental team or alternative practice settings through learning skills including communication, teamwork, funding, and business and management practices. The focus is on the skills and knowledge necessary for managing a dental practice or an alternative practice setting in order to improve the delivery of services to patients. The student researches traditional and alternative practice settings and develops and presents their own ideal practice plan.
3 hours of online lecture per week Prerequisite: DHY 3010

DHY 4237 Introduction to Dental Hygiene Research Methods (3) **spring**
This course includes strengths and limitations of quantitative and qualitative research methods while developing methodological skills and proficiencies related to research. It includes development of literature review, a research proposal, and completion of survey research.
3 hours of online lecture per week Prerequisite: DHY 3010

Diesel (DSL)

DSL 1010 Steering, Suspension Systems, & Alignment (3) **fall**
This course comprehensively presents the theory, design, construction, and repair of suspension, steering, and braking systems in diesel-powered equipment and trucks. Topics include steering systems; conventional suspension systems; air suspension systems; wheels and tires; and alignment.
2 hours of lecture, 3 hours of lab per week
[Course fee: $200]

DSL 1020 Diesel Power Systems (4) **spring**
This course comprehensively presents the theory, design, construction, and repair of the diesel power plant. Topics include fixed and mobile diesel power systems; engine design (types and components); definition of power and calculations; engine disassembly, reconditioning, and reassembly; cooling and lubrication systems; breathing and retarding systems; and run-in, performance, maintenance, and failure analysis.
3 hours of lecture, 3 hours of lab per week
[Course fee: $200]

DSL 1030 Diesel Electronics Lab (1) **fall**
This lab is the diesel companion to GTS 1120 and includes the practical application of Ohm's law; Kirchhoff's law; analysis, diagnosis, and repair of faulty electrical circuits; and the diagnosis, replacement, and repair of electrical and electronic components.
3 hours of lab per week Corequisite: GTS 1120
[Course fee: $100]

DSL 1050 Preventive Maintenance (3) **fall**
This course presents the development and administration of preventive maintenance programs. Topics include PM schedules; types of services; record-keeping; out-of-service vehicles; winterizing; coolants and additives; oil and lubricants; analysis and additives; contamination control; and track maintenance.
2 hours of lecture, 3 hours of lab per week
[Course fee: $200]

DSL 1070 Diesel Electrical Systems Lab (1) **spring**
This lab is the diesel companion to GTS 1040 and includes operation and testing of storage batteries, starting systems, charging systems, and basic accessory systems. The student becomes familiar with various types of test equipment, diagnostic charts, and vehicle wiring schematics.
3 hours of lab per week Corequisite: GTS 1040
[Course fee: $100]

DSL 1110 Heavy Duty Braking Systems (3) **spring**
This course comprehensively presents the theory, design, construction, and repair of braking systems in diesel-powered equipment and the performance of wheel alignments on trucks. Topics include alignment; air braking systems; hydraulic and air-over-hydraulic braking systems; ABS and electronic brakes; and noise, vibration, and harshness.
2 hours of lecture, 3 hours of lab per week Prerequisite: DSL 1010
[Course fee: $200]

DSL 2010 Fuel Systems (4) **fall**
This course comprehensively presents the theory, design, construction, and repair of diesel fuel systems. Topics include an overview of diesel fuel injection systems; the chemistry of combustion; diesel fuel and alter-

natives; fuel transfer systems; mechanical injector nozzles and Unit Electrical Injectors (UEI); Bosch, Detroit Diesel, Caterpillar, and Cummins DFI systems; governors; system diagnosis and service; and computerized fuel control systems. Light-duty diesel fuel systems are also presented.
3 hours of lecture, 3 hours of lab per week
[Course fee: $200]

DSL 2020 Chassis Electrical & Electronic Systems (4) **spring**
This course comprehensively presents advanced diesel chassis electrical and electronic systems and teaches diagnostic and troubleshooting skills. Topics include advanced networks and multiplexing, instrument panels, and AC, lighting, wiper/ washer, alarm, collision avoidance, supplemental restraint, ground-based communication, satellite-based communication, and accessory systems.
3 hours of lecture, 3 hours of lab per week Prerequisite: DSL 1020
[Course fee: $200]

DSL 2030 Hydraulics (3) **spring**
This course comprehensively presents the theory, design, construction, and repair of mobile hydraulic systems. Topics include hydraulic systems and components; hydraulic symbols and engineering drawings; pilot systems; and electronic control systems.
2 hours of lecture, 3 hours of lab per week Prerequisite: DSL 1020
[Course fee: $200]

DSL 2040 Power Transmission (3) **spring**
This course comprehensively presents power transmission systems and teaches diagnostic and troubleshooting skills. Topics include an introduction to power transmissions; clutches and torque converters; manual transmissions; gear theory; planetary gear theory; hydraulic planetary controls and support systems; powertrain management and electronically controlled transmissions; the Allison commercial Electronic Control (CEC) system; the Eaton AutoShift transmission; drive shafts; final drives; and tracks.
2 hours of lecture, 3 hours of lab per week Prerequisite: DSL 1030
[Course fee: $200] Corequisite: ATT 2020 or DSL 2020

DSL 2802 DPT Summer Internship Review (1) **fall**
This course provides a critique for a summer internship. Pass/No Pass.
[Course fee: $250]

Economics (ECO)

ECO 2060 Survey of Economics **(4)** **fall**
This course presents both micro- and macroeconomic principles and concepts. Topics include scarcity; human economic behavior; supply and demand; economic markets; gross national product; business cycles; unemployment and prices; recession and inflation; fiscal and monetary policy; and international trade.
4 hours of lecture per week

Education (EDU)

EDU 2051 Teaching Methods I (3) **as required**
This course prepares new CTE teachers coming from their professions to intellectually and emotionally engage their students in academically rigorous activities to teach 21st century skills.
45 hours of lecture per term

EDU 2052 Teaching Methods II (3) **fall**
This course is a continuation of EDU 2051 that focuses on further skills to manage the classroom; develop and implement curriculum; and engage in best teaching practices.
45 hours of lecture per term Prerequisite: EDU 2051

EDU 2135 Instruction for Students with Special Needs (3) **as required**
This course teaches technical educators how students learn differently, with an overview of applicable education laws for students with and without disabilities and how schools must provide multiple layers of support for students. It discusses assessment, eligibility, the special education process, and the components of an Individualized Education Plan, as well as 504 and EST plans and how technical educators may provide an environment that's more focused on students' strengths than weaknesses. It addresses the collaborative role the technical instructor plays in the education plan developed for these learners.
45 hours of lecture per term

EDU 2200 Assessment in the CTE Classroom (1) **spring**
This course is for educators in CTE environments who are striving to implement a proficiency-based learning and assessment approach. Educators use their program's intended learning standards/skills, scope, and sequence documentation and targeted assessments and begin to analyze and adjust assessments to show evidence of proficiency in order to better promote student learning and accountability within the context of proficiency-based learning.
15 hours of lecture per term

EDU 2802 Educational Externship (1) **fall**
This is an education externship for the new CTE teacher.

EDU 3051 Teaching Methods III (3) **spring**

This course improves the competence, self-efficacy, and career commitment of new CTE teachers entering from their professions so that their students are intellectually and emotionally engaged in rich, academically vigorous activities in which they develop 21st century skills. The third of four teaching methods courses, it focuses on classroom management; development and implementation of curriculum; and best teaching practices. There is an online component and students are expected to participate effectively.

45 hours of lecture per term Prerequisite: EDU 2052

EDU 3052 Teaching Methods IV (3) **summer**

This course improves the competence, self-efficacy, and career commitment of new CTE teachers entering from their professions so that their students are intellectually and emotionally engaged in rich, academically vigorous activities in which they develop 21st century skills. The final of four teaching methods courses, it focuses on classroom management; development and implementation of curriculum; and best teaching practices. It revisits prior years' curriculum and its application on the classroom and further improves it based on knowledge and experience.

45 hours of lecture per term Prerequisite: EDU 3051

EDU 3115 Issues & Trends in Technical Education (3) **fall**

This course covers current issues in technical education and includes an in-depth examination of state and federal laws and policies that impact Vermont's career and technical education centers and how these centers can create welcoming, safe, and respectful learning environments for all students. Topics include creating culturally relevant career and technical education program curricula; ensuring gender equity in career and technical education; issues of social class and poverty and the academic achievement gap in career and technical education; issues of race and recognizing racism in career and technical education; cultivating respectful school, technical program, and classroom climates; professional ethics; and continuous professional growth and learning.

45 hours of lecture per term Prerequisite: EDU 3052

EDU 4600 Education Capstone (1) **spring**

This course helps the student create a professional portfolio for Level I Vermont Teacher Licensure and reviews the Results Oriented Program Approval manual, which serves as a guide to compiling a targeted, thorough, and reflective portfolio.

15 hours of lecture per term Prerequisite: EDU 2135, 2200,3115

Electromechanical Engineering Technology (ELM)

ELM 3015 Sensors & Instrumentation (3) **fall**

This course introduces the type of sensors used in research and industry to measure physical and mechanical parameters and the standard methods of interfacing these devices. Topics include investigation of the underlying physical phenomenon which each transducer exploits and various signal conditioning and interfacing strategies. Typical devices covered include strain gages, LVDTs, load cells, pressure transducers, tachometers, accelerometers, temperature sensors, level sensors, and optical sensors.

2 hours of lecture, 3 hours of lab per week Prerequisite: ELT 1110 or 2072; MAT 1520; PHY 1042

[Course fee: $375] Corequisite: CIS 2025; ELT 1032; MAT 2532

ELM 4015 Electromechanical Power Systems (3.5) **fall**

This course deals with the conversion and manipulation of power with emphasis on power actuator specifications and sizing starting with electronic power actuators and moving to electromagnetic mechanical energy conversion through motors; generators; hydraulic and pneumatic actuators; and pumps. The student designs finite state machine sequential control and logical control using PLCs; implements logical and sequential control using commercial PLCs; and characterizes, manipulates, and controls power devices using lab standard measuring hardware and software.

3 hours of lecture per week, 3 hours of lab every other week Prerequisite: ELM 3015; MAT 3170

[Course fee: $125]

ELM 4231 Control Systems I (3.5) **fall**

This course introduces modeling and analysis of various systems (electrical, mechanical, fluid, thermal) through state variable models and transfer functions, including non-linear aspects of real dynamic systems and their linear approximations. It emphasizes control systems, block diagrams, single loop control using industrial controllers (PID), and their experimental tuning. The student applies these concepts in the characterization and control of lab physical plants and uses MATLAB with Simulink extensively.

3 hours of lecture per week, 3 hours of lab every other week Prerequisite: ELT 2061; MAT 3170

[Course fee: $50]

ELM 4232 Control Systems II (3.5) **spring**

This course deals with the design of controllers using root locus, frequency response, and other alternative techniques for multivariable systems and includes digital control and its implementation. The student applies these techniques to control lab physical plants and uses MATLAB with Simulink extensively.

3 hours of lecture, 1.5 hours of lab per week Prerequisite: ELM 4231

[Course fee: $125]

ELM 4701 Electromechanical Project I (2) **fall**

This course emphasizes project design and manufacturing issues. Topics include planning and budgeting; design for manufacturability; safety in the design; fabrication techniques; testing for safety and reliability; and quality control. The student gets a small design then selects and begins planning a team-oriented project with major software, electrical, and mechanical components that's completed in ELM 4702.
1 hour of lecture, 3 hours of lab per week
[Course fee: $250] Prerequisite: ELM 3015; ELT 1032, 2041, 2050, 2061; MAT 3170; MEC 1020, 2010, 2035, 2065
Corequisite: ELM 4015, 4231

ELM 4702 Electromechanical Project II (3) **spring**
This course is a continuation of ELM 4701 dealing primarily with issues of large-scale projects with emphasis on coordination between members of the design teams with frequent seminars and mini-presentations to communicate the design and the team's progress. A major presentation of the team project is required at the end of term.
1 hour of lecture, 6 hours of lab per week Prerequisite: ELM 4701
[Course fee: $250] Corequisite: ELM 4232, ELT 3040

Electrical Engineering Technology (ELT)

ELT 1015 Introduction to Engineering (1) **fall**
This course facilitates a successful transition to college and to engineering tools and strategies. It focuses on orientation, academic success strategies, professional development, and an introduction to a degree program. It provides hands-on experience using technical software and creating technical documentation using Word, Excel, LabVIEW, and Multisim. Topics include student rights and responsibilities; grading and graduation requirements; campus/site resources; time management; note taking; career opportunities; terminology; layout; chart creation; effective chart usage; and integrating text and graphics.
3 hours of lab per week
[Course fee: $140] Corequisite: ELT 1031; MAT 1311

ELT 1031 Electrical Circuits I (4) **fall**
This course is an introductory study of DC and AC electrical circuits that includes electrical charge, current, voltage, resistance, energy, power, capacitance, inductance, and the transient behavior of RC and RL circuits. It develops the concepts of frequency, period, phase, and magnitude of sine waves for AC and examines the electrical circuit parameters as phasors and complex numbers expressed in polar and rectangular form. Major AC topics include reactance, impedance, power, and resonance. Electric circuit theory includes Ohm's law; Kirchhoff's laws; series and parallel circuits; and electrical sources. It also introduces voltage and current dividers and Thevenin's theorem. Lab exercises develop the use of basic measurement equipment, such as the ammeter, voltmeter, and oscilloscope.
3 hours of lecture, 3 hours of lab per week
[Course fee: $50] Corequisite: ELT 1015; MAT 1311

ELT 1032 Electrical Circuits II (4) **fall**
This course is a continuation of ELT 1031 and introduces circuit analysis using advanced network theorems and techniques. It covers topics such as superposition; mesh and nodal analysis; Thevenin's theorem; controlled sources, bridges, power factor correction, transformers, polyphase circuits, filters, parallel resonance, frequency response, and response to non-sinusoidal signals. Lab exercises use oscilloscopes, function generators, and frequency counters on circuits.
3 hours of lecture, 3 hours of lab per week Prerequisite: ELT 1031 or 2071; MAT 1312
[Course fee: $50]

ELT 1110 Introduction to Digital Circuits (3) **spring**
This course introduces basic logic principles, logic circuit definition, and binary number theory and develops the concepts of combinational logic circuits along with logic circuit generation, minimization, and construction. It deals with memory and sequential logic circuits including counters, shift registers, and random-access memories. State machines are discussed and illustrated through more complex systems. The lab develops a strong working knowledge of modern CAD tools and technologies, including VHDL and circuit simulators, as well as the function and application of PLDs.
2 hours of lecture, 3 hours of lab per week
[Course fee: $120]

ELT 1411 Industrial Electricity Safety (2) **fall/spring**
This course provides a survey of various codes applied to the electrical construction industry. Topics include the structure of the NEC (NFPA 70); its various articles and subparts; the basic components (conductors, raceways, grounding) that relate to safety; the importance of OSHA, IEEE, ANSI, UL, and other organizations to electrical safety; the importance of arc flash safety; short circuit and ground fault protection; overload protection; and various circuit protection devices and schemes.
2 hours of lecture per week

ELT 2011 Introduction to Power Systems (3) **fall**
This course provides a foundation for the study and understanding of industrial power systems; the make-up of how electrical power is delivered to the typical industrial/manufacturing facility; and the subsequent distribution of that power throughout the facility until it reaches the end user or equipment. It surveys the 2017 National Electric Code and 2018 OSHA standard for Electrical Safety in the Workplace with an examination

of how these codes and standards are applied. It examines electrical fundamentals for the maintenance technician and allows for a complete understanding of the technician's role. The topic of safety and the use of safe work practices are addressed as paramount while working with and around power systems.
3 hours of lecture per week

ELT 2015 Introduction to Projects (1) **fall**
This course introduces electrical product development and fabrication. Topics include schematic and circuit layout software and conventions, printed circuit board assembly, enclosures, connectors, scheduling, budgeting, and documentation. Each student works on a common product of reasonable complexity; develops and assembles a printed circuit board and documents; and presents the finished product. The lab develops practical skills in circuit board layout and fabrication, time management, and technical presentation.
3 hours of lab per week Prerequisite: ELT 1110, 2041
[Course fee: $75]

ELT 2041 Electronic Circuits I (4) **spring**
This is an introductory course in electronic circuits that extends DC-AC circuits into active devices and their associated circuitry. Topics include the transistor as a small signal amplifier and as a switching element; op-amp circuits; diodes; four layer devices; bipolar junction and field-effect transistors; oscillators; switching amplifiers; and interfacing circuits common to computer applications.
3 hours of lecture, 3 hours of lab per week Prerequisite: ELT 1031
[Course fee: $50] Corequisite: MAT 1312

ELT 2042 Electronic Circuits II (4) **spring**
This course is a continuation of ELT 2041 and addresses electronics from a system and applications view rather than a device view. Topics include two-port networks; cascaded amplifiers; frequency response; Bode plots; differential amplifiers; operational amplifiers; active filters; linear and switching power supplies; oscillators; and modulation.
3 hours of lecture, 3 hours of lab per week Prerequisite: ELT 2041; MAT 1520
[Course fee: $50]

ELT 2050 Microcomputer Techniques (4) **fall**
This course introduces the use of microcontrollers in electronic circuits and covers concepts of computer architecture such as CPUs, memory, digital input/output, interrupts, and A/D conversion. The student uses microcontrollers with applications such as PWM motor control, OLED displays, analog sensors, pulse counting, switch, and keypad inputs and advances their ability to program embedded electronic devices using state machines and timing considerations.
3 hours of lecture, 3 hours of lab per week Prerequisite: CIS 2025 or 2262 or 2271; ELT 1110 or 2072
[Course fee: $175]

ELT 2061 Electromechanical Systems I (4) **spring**
This course starts with an overview of control systems using block diagrams for description and analysis and introduces electronic operational amplifier circuits early due to their prevalence in conditioning transducer signals and as analog controller elements. Laplace transform techniques predict both first and second order system responses for the typical input functions. Topics include PID controller functions; steady state error and stability; and algebraic prediction of closed loop responses. Bode Plot analysis in the frequency domain is used as an alternative method to the time domain response.
3 hours of lecture, 3 hours of lab per week Prerequisite: ELT 1031 or 2071; MAT 1520; PHY 1042
[Course fee: $50]

ELT 2071 Basic Electricity (3) **fall**
This course introduces the physical concepts of electricity and electrical devices and covers fundamentals of power, resistance, inductance, capacitance, motors, and generators from the standpoint of their relationship to mechanical applications.
2 hours of lecture, 3 hours of lab per week Prerequisite: MAT 1312
[Course fee: $90]

ELT 2072 Electronics (3) **spring**
In this course, the student examines linear and digital electronics, including PLCs, from the standpoint of the electrical-mechanical interface. Concepts of sensors and transducers, relays, diodes, power supplies, solid state switches, and integrated logic circuits are covered.
2 hours of lecture, 3 hours of lab per week Prerequisite: CIS 1050 or MEC 1010; ELT 2071
[Course fee: $50]

ELT 2073 LabVIEW (3) **as required**
This course introduces the basics of the program and system design platform LabVIEW. The student develops and uses a series of VIs, tests, and control systems within the LabVIEW environment and explores advanced data analysis using the built-in program libraries with results displayed on user-defined graphical readouts.
2 hours of lecture, 3 hours of lab per week Prerequisite: ELT 1031 or 2071
[Course fee: $300]

ELT 2075 Programmable Logic Controllers (3) **spring**

The course presents PLC design methodology, programming procedures, and practical system implementation topics in an interactive lecture setting. The design principles discussed during lecture are reinforced with demonstrations and participative exercises.
3 hours of lecture per week Prerequisite: ELT 1031; MAT 1312

ELT 2130 Industrial Electronics (4) spring
This is a multi-purpose course designed to acquaint the student with the electronic devices, circuits, and computer techniques used to control industrial operations. It specifically includes sensors and related instrumentation; power switching devices; DC and AC motors; stepping and brushless motors; and PLCs. Application and control issues involved with these devices are investigated with additional topics as time permits.
3 hours of lecture, 3 hours of lab per week Prerequisite: ELT 1032, 2041; MAT 1520
[Course fee: $50] Corequisite: ELT 2042

ELT 2210 Introduction to Solid State Lighting (3) fall
This course introduces the fundamentals of solid state lighting systems. The student uses various LEDs, optics, and heat sinks to create a total lighting solution and studies various applications for using LEDs for lighting.
2 hours of lecture, 2 hours of lab per week Prerequisites: MAT 1312; PHY 1041 or 2041
[Course fee: $150]

ELT 2720 Electrical Project (2) spring
This course introduces electrical product development and fabrication. Topics include schematic and circuit layout conventions; printed circuit board assembly; enclosures; connector and cabling options; and scheduling, budgeting, and documenting the project. Each student works on a product of reasonable complexity; develops and assembles a printed circuit board; and documents and presents the finished product.
1 hour of lecture, 3 hours of lab per week Prerequisite: ELT 2015, 2041, 2050
[Course fee: $150] Corequisite: CIS 2151 or ELT 2130

ELT 3010 Digital Circuits II (3) fall
This course extends the student's skill with digital hardware and covers more advanced topics including advanced digital design techniques. They examine various design methodologies such as state machine design and hardware description languages. Applications focus on the design of computer hardware subsystems such as arithmetic logic units and memory. Labs illustrate the various methods for design entry such as schematic entry and VHDL, simulation, and testing. Designs are implemented using commercial PLDs.
2 hours of lecture, 2 hours of lab per week Prerequisite: ELT 2050
[Course fee: $100]

ELT 3040 Electronic & Data Communications (3.5) spring
This course introduces the student to concepts necessary to understand both analog and digital data communications in today's networked world. Topics include media characteristics; network protocols; data-encoding techniques; error detection and correction; encryption; data compression; Fourier series analysis, and frequency division multiplexing, noise, and modulation techniques.
3 hours of lecture, 1.5 hours of lab per week Prerequisite: CIS 2025; ELT 2050; MAT 1520
[Course fee: $100]

ELT 3050 Microprocessor Techniques II (4) spring
This course expands on the microcontroller abilities taught in ELT 2050. Topics include proper embedded software techniques, real-time operating systems, use of state machines, applications using common communication protocols, interfacing to sensors, and display devices. The student creates mixed-language applications using both C and assembly in a structured programming environment.
3 hours of lecture, 3 hours of lab per week Prerequisite: ELT 2050
[Course fee: $150]

ELT 3053 Electronics III (4) fall
This course is a continuation of ELT 2042, incorporating current devices and techniques in the industry. It has four main topics: power management (including buck and boost switching power supplies, switched capacitor, low-voltage power control circuitry, and drivers); noise, electromagnetic frequency spectrum, AM modulation, frequency modulation, and receivers; RF concepts and high-frequency behavior of passive components and transmission line concepts; and phase lock loop and frequency multipliers.
3 hours of lecture, 3 hours of lab per week Prerequisite: ELT 2042; PHY 1042
[Course fee: $50]

ELT 3070 Semiconductor Technology (3) fall
This course broadly covers semiconductor technologies as a foundation of all computer and communication systems. It begins with a survey of the unit processes involved in creating CMOS semiconductor chips like lithography, reactive ion etch, and ion implant. It covers the tools and methodologies involved in creating more complex semiconductor circuits such as creation of standard logic libraries, schematics, and layout. The student examines electrical properties of materials and the DC and digital circuit concepts that motivate much of the activity to understand the challenges facing manufacturers and designers in this globally vital industry.
3 hours of lecture per week Prerequisite: MAT 1312

ELT 4010 Computer Architecture (3) fall

This course discusses the architecture of computer systems inside and outside the CPU. Topics include pipelines; cache; floating-point unit; RISC vs. CISC architecture; branch prediction; pipeline interlocks; coordinating SMP machines; and the system at large (busses of various types, memory architecture, disk controllers, NICs, etc.) Emphasis is on real systems and characteristics of current technology.
3 hours of lecture per week — Prerequisite: CIS 2010

ELT 4020 Digital Signal Processing (3) — **spring**
This course covers DSP theory and applications from an introductory to an intermediate level. The implementation of DSP algorithms and mathematical functions such as IIR and FIR filters, correlation routines, DFTs, and IDFTs are examined.
3 hours of lecture per week — Prerequisite: ELT 2050; MAT 2532

ELT 4701 Electrical Project I (2) — **fall**
This course emphasizes project design, planning, and manufacturing issues. Topics include planning and budgeting; design for manufacturability; safety in the design; fabrication techniques; testing for safety and reliability; and quality control. The student gets a small electrical/electromechanical design on which to apply the lecture material then selects and begins planning a major team-oriented project with major software and electrical components that's completed in ELT 4702.
1 hour of lecture, 3 hours of lab per week — Prerequisite: ELT 1032, 2042, 2050
[Course fee: $250] — Corequisite: ELM 4015, 4231

ELT 4702 Electrical Project II (3) — **spring**
This course is a continuation of ELT 4701 dealing primarily with issues of large-scale projects. Coordination between members of design teams is stressed with frequent seminars and mini-presentations to communicate the team's progress. A major presentation of the team project is required at the end of the term.
1 hour of lecture, 6 hours of lab per week — Prerequisite: ELT 4701
[Course fee: $250] — Corequisite: ELM 4232; ELT 3040

Emergency Medical Services (EMS)

EMS 1020 The Art of Paramedicine (2) — **fall**
This course prepares the student to manage human relations challenges; encourages broader views and an awareness of the uniqueness of self and humankind; and explores the finer aspects of communication, listening, assertiveness, and documentation. Topics include confidentiality; legal and ethical behavior; stress management; scene management; the roles and responsibilities of the paramedic; public health; workforce safety and wellness; the impaired provider; research in EMS; the history of EMS; and EMS systems.
2 hours of hybrid lecture per week — Corequisite: BIO 2011; EMS 1030, 1040, 1050

EMS 1030 Pharmacology & Medication Administration for the Prehospital Professional (3) — **fall**
This course covers the concepts of pharmacology needed to understand and safely administer standard prehospital medications. Topics include pharmacokinetics, pharmacodynamics, medication administration, drug dosage calculations, pharmacological terminology, drug legislation, drug references, toxicology, vascular access, and blood products.
3 hours of hybrid lecture per week — Corequisite: BIO 2011; EMS 1020, 1040, 1050

EMS 1040 Airway Management for the Prehospital Professional (1) — **fall**
This course prepares the student to manage adult, pediatric, and infant airways with emphasis on excellent BLS skills and progresses through the techniques of common prehospital ALS airway skills. The student uses scenarios and simulation prior to advancing to clinical and field opportunities to demonstrate skills.
1 hour of hybrid lecture per week — Corequisite: BIO 2011; EMS 1020, 1030, 1050

EMS 1050 Paramedic Principles & Practices I (2) — **fall**
This interactive course assesses the student's BLS skills including BLS management, CPR, AED, and oxygen therapy. The student learns Medical Assessment and Trauma Assessment at the ALS provider level and uses simulation and scenario-based activities to incorporate this new knowledge. Upon successful completion of the applicable portions of this course, the student is allowed to advance to the clinical setting (OR and ED). Pass/No Pass.
6 hours of lab per week — Corequisite: BIO 2011; EMS 1020, 1030, 1040
[Course fee: $500]

EMS 1210 Medical Emergencies for the Prehospital Professional (4) — **spring**
This course covers common medical complaints encountered by the paramedic. The student uses critical-thinking skills to develop differential diagnoses and plans of care. Topics include respiratory, immunology, hematology, sepsis, endocrine, gastrointestinal, genitourinary, non-traumatic musculoskeletal disorders, allergic reactions, psychological, and neurological emergencies and conditions. The course reinforces and enhances knowledge of anatomy, physiology, and pharmacology and includes Advanced Medical Life Support.
4 hours of hybrid lecture per week — Prerequisite: EMS 1020, 1030, 1040, 1050, 1801
Corequisite: BIO 2012; EMS 1230, 1240, 1802

EMS 1230 Cardiology for the Prehospital Professional (3) — **spring**
During this intensive course, the student gains in-depth knowledge of cardiac electrophysiology; static and dynamic cardiac rhythm interpretation; arrhythmia management; and assessment and management of com-

mon prehospital cardiac-related problems. Topics include 12-lead EKG interpretation; Acute Coronary Syndrome and ST Elevation Myocardial Infarction management; and Advanced Cardiac Life Support. Lecture, scenarios, and simulation opportunities are included to enhance learning.
3 hours of hybrid lecture per week — Prerequisite: EMS 1020, 1030, 1040, 1050, 1801
Corequisite: BIO 2012; EMS 1210, 1240, 1802

EMS 1240 Paramedic Principles & Practices II (2) — spring
This interactive course presents a variety of medical scenarios and simulations requiring paramedic-level assessments and interventions and demonstrates communication skills, teamwork, documentation, and transfer of theory into practice. The student participates in clinical rotations in the ED, OR, ICU, maternity, pediatric, and psychiatric units. Pass/No Pass.
6 hours of lab per week — Prerequisite: EMS 1020, 1030, 1040, 1050, 1801
[Course fee: $150] — Corequisite: BIO 2012; EMS 1210, 1230

EMS 1290 Paramedic Clinical Time (Extended) (1) — as required
The student who didn't complete all of the clinical objectives in the 240 scheduled hours during the regular didactic portion of the program may schedule additional time to complete the necessary objectives. Locations and times depend on what objectives still need to be achieved. These hours must be completed prior to the start of the next term. Pass/No Pass.
Prerequisite: EMS 1801, 1802, 1803
Corequisite: EMS 1804

EMS 1310 Obstetrics, Gynecology, & Pediatrics for the Prehospital Professional (3) — summer
In this course, the student learns to assess and manage gynecological and obstetrical emergencies and childbirth and to care for the pediatric patient from birth through age 18. The material includes topics of abuse and neglect; pediatric and neonatal resuscitation; and technology-dependent children.
3 hours of hybrid lecture per week — Prerequisite: EMS 1210, 1230, 1240, 1802
Corequisite: EMS 1320, 1330, 1340, 1350

EMS 1320 Trauma Management for the Prehospital Professional (3) — summer
This course examines the skills and knowledge needed to assess and manage a patient with traumatic injuries and shock. Topics include trauma systems; hemorrhage and shock; special considerations; and the following types of trauma: blunt force; penetrating; soft-tissue; burn; orthopedic; thoracic; abdominal; head, face, neck, and spinal; nervous system; and environmental.
3 hours of hybrid lecture per week — Prerequisite: EMS 1210, 1230, 1240, 1802
Corequisite: EMS 1310, 1330, 1340, 1350, 1803

EMS 1330 Emergency Medical Services Operations (2) — summer
In this course, the student develops their role as an EMS leader; learns about operations for ground and air ambulances; responds to multiple-casualty Incidents; demonstrates incident management and the incident command system; engages in special rescue operations; deals with hazardous materials on emergency scenes; demonstrates crime scene awareness; examines special considerations for rural EMS; and discusses terrorism.
2 hours of hybrid lecture per week — Prerequisite: EMS 1210, 1230, 1240, 1802\
Corequisite: EMS 1310, 1320, 1340, 1350, 1803

EMS 1340 Special Considerations for the Prehospital Professional (1) — summer
During this highly interactive course, the student explores challenges in dealing with geriatric, bariatric, and disabled clients. The course presents normal differences based on age, size, and underlying medical problems and challenges the student to think critically about providing the best care possible. Topics include technology-dependent patients and the logistics of emergency calls versus transfers.
1 hour of lecture per week — Prerequisite: EMS 1210, 1230, 1240, 1802
Corequisite: EMS 1310, 1320, 1330, 1350, 1803

EMS 1350 Paramedic Principles & Practices III (2) — summer
In this course, the student experiences a variety of trauma, special circumstances, and EMS operations scenarios and simulations to enhance their ability to respond appropriately to similar situations in the field. During this accelerated summer session, the student spends time in the OR; ICU; ED; pediatrics; labor and delivery; and mental health. Pass/No Pass.
6 hours of lab per week — Prerequisite: EMS 1210, 1230, 1240, 1802
[Course fee: $150] — Corequisite: EMS 1310, 1320, 1330, 1340, 1803

EMS 1801 Paramedic Field Experience I (1) — fall
This course transitions the student from the role of helper/BLS-provider to team leader. The student rides with a paramedic preceptor and incorporates skills learned in first term classes. Pass/No Pass.
36 hours of field experience per term — Corequisite: BIO 2011; EMS 1020, 1030, 1040, 1050
[Course fee: $150]

EMS 1802 Paramedic Field Experience II (1) — spring
This course allows the student to demonstrate an expanded depth of skills and knowledge. They continue to work with a preceptor to provide safe and therapeutic care, communicate effectively, and demonstrate an understanding of the material covered in class. Pass/No Pass.

112 hours of clinic, 36 hours of field experience per term | Prerequisite: EMS 1020, 1030, 1040, 1050, 1801
[Course fee: $150] | Corequisite: BIO 2012; EMS 1210, 1230, 1240

EMS 1803 Paramedic Field Experience III (1) **summer**
In this course, the student rides with a preceptor, acting as the team leader on calls and honing their professional communication skills. Assessment is based on their ability to perform the functional job description of a paramedic; to coordinate and manage a scene and the patient; and to provide safe and effective care. Pass/No Pass.
142 hours of clinic, 36 hours of field experience per term | Prerequisite: EMS 1210, 1230, 1240, 1802
[Course fee: $150] | Corequisite: EMS 1310, 1320, 1330, 1340, 1350

EMS 1804 Paramedic Field Internship (0) **as required**
During this immersion experience for the student who has successfully completed all didactic portions of the program, the student acts as a paramedic under the supervision of a preceptor and as the team leader managing the scene, patient, and crew. Assessment is based on their ability to perform the functional job description of a paramedic; to coordinate and manage a scene and the patient; and to provide safe and effective care. This course must be completed prior to the start of the next term. Time is extended as needed to meet the objectives of the internship. Pass/No Pass.
Minimum of 360 hours, maximum of 3 terms drive time | Prerequisite: EMS 1310, 1320, 1330, 1340, 1350, 1803
[Course fee: $250]

English (ENG)

ENG 1042 Introduction to College English (3) **fall/spring**
In this course, the student develops their reading skills by analyzing examples of professional writing and develops their writing skills through internal writing and at least five essays. They review principles of grammar and sentence construction and learn rhetorical strategies. Emphasis is on the process of revision through class editing of essays with computer skills taught in the lab.
3 hours of lecture, 1 hour of lab per week

ENG 1060 Freshman Composition (3) **as required**
In this course, the student thinks and reads critically, writes effectively, and understands the fundamentals of literary analysis and written composition. Classroom discussion of assigned readings and the construction of related essays are stressed. A required research paper demonstrates the student's use of appropriate research materials in terms of locating, organizing, and presenting their materials in standard MLA format. The writing graduation standard and information literacy standard are assessed in this course.
3 hours of lecture per week

***ENG 1061 English Composition* (3)** **as required**
In this course, the student reads and thinks critically, writes effectively, and understands the fundamentals of literary analysis and written composition. Classroom discussion of assigned readings and the construction of related essays are stressed. A required research paper demonstrates the student's use of appropriate resource materials in terms of locating, organizing, and presenting their materials in an accepted format. The writing graduation standard and information literacy standard are assessed in this course, which is writing-intensive.
3 hours of lecture per week

ENG 2080 Technical Communication (3) **as required**
This course is a comprehensive study of the principles, methods, and forms needed to produce clear and effective communications and technical reports, both written and oral. It stresses business correspondence and the use of graphics in documents and oral presentations. A major technical report is required and is used for assessment of the writing graduation standard.
3 hours of lecture per week | Prerequisite: ENG 1061

Ground Transportation Services (GTS)

GTS 1040 Vehicle Electrical Systems (3) **spring**
This course gives a thorough understanding of electrical systems and teaches diagnostic and troubleshooting skills. Topics include the operation and testing of storage batteries, starting systems, charging systems, ignition systems, and basic accessory systems. The student becomes familiar with various types of test equipment, diagnostic charts, and vehicle wiring schematics.
3 hours of lecture per week | Prerequisite: GTS 1120
[Course fee: $200] | Corequisite: ATT 1110 or DSL 1070

GTS 1120 Vehicle Electronics (3) **fall**
This course introduces general vehicle electrical and electronic principles, theory, and components. Topics include Ohm's law, circuit analysis, basic circuits, diodes, transistors, relays, and solenoids.
3 hours of lecture per week
[Course fee: $200] | Corequisite: ATT 1090 or DSL 1030

History (HIS)

HIS 3056 Race in America **(3)** **as required**

This course uses a multidisciplinary lens to analyze American racial attitudes and beliefs over time, emphasizing the historical roots of American racism and how racial perceptions have evolved as material circumstances and ideological traditions changed. Readings, lectures, discussion, and guest speakers address both progressive and regressive racial attitudes. The student explores how racial attitudes in culture, politics, work, gender relations, violence, religion, and ethnicity profoundly shape twenty-first century America.

3 hours of lecture per week Prerequisite: ENG 1061

HIS 3130 The Civil War & Reconstruction **(3)** **as required**

This course explores the Civil War and its aftermath by discussing the period's most important themes, reading the work of distinguished authors, and examining documents left by participants. Topics include the ebb and flow of military campaigns; the northern and southern home fronts; the politics of war and peace; and the impact of the war on black and white Americans in the North and in the South.

3 hours of lecture per week Prerequisite: ENG 1061

HIS 3165 Vermont History **(3)** **as required**

This course introduces the major historical themes and questions that have shaped the state of Vermont over time and provides a close look at Vermont's historical, social, and economic development; its problems as a republic; the struggle for statehood; and its constitution and government today. Instruction observes Vermont's place in American civilization from its inventive, cultural, educational, literary, and political contributions.

3 hours of lecture per week Prerequisite: ENG 1061

Humanities (HUM)

HUM 2020 Bioethics **(3)** **as required**

This course explores ethical issues and decision-making processes involved in biomedical research and practice as viewed from legal, medical, social, and philosophical perspectives. The student applies philosophical frameworks, theoretical approaches, argument development skills, and critical thinking to address moral questions pertaining to the beginning and end of life; biotechnology and genetic experimentation; justice in healthcare; responsibilities of physicians; environmental health; and other pertinent topics.

3 hours of online lecture per week Prerequisite: ENG 1061

HUM 3050 Theories of Science & Technology (3) **as required**

This course explores historical and philosophical perspectives with special emphasis on the relationships of science, technology, and social and political structures and individual responsibility. Topics include the nature of science and technology; elitism; goals and control; and the role of the individual scientist or technician.

3 hours of lecture per week Prerequisite: ENG 1061

HUM 3060 Cyberethics (3) **as required**

This course introduces the of ethical inquiry and the ethical implications of current computing technologies and applications.

3 hours of lecture per week Prerequisite: ENG 1061

HUM 3210 Folklore, Literature, & Legends of New England (3) **as required**

Grounded in academic theory and focusing on literature, folklore, and legends, this writing-intensive course explores broad issues of representation, cultural, social, and political issues and the shaping of a unique culture and people. Through the study of folklore in its various forms; classic and contemporary literature by New England authors; and oral legends, the student gains a broader understanding of New England; its history and culture; and their own role in shaping the culture and world in which they live. A field trip immerses the student in the living history of New England.

3 hours of lecture per week Prerequisite: ENG 1061

HUM 3490 Crime & Punishment in Film & Literature (3) **as required**

Through analysis of literature, film, and media, this course examines contemporary legal, ethical, philosophical, and ideological issues of the American criminal justice system. Topics include criminal psychology; wrongful conviction and the innocence movement; and mass incarceration and race. The approach follows from the perspective that the human condition is itself worthy of study and that examining human experience in the context of established intellectual frameworks can deepen our ways of seeing, understanding, impacting, and connecting with others and the larger world.

3 hours of lecture per week Prerequisite: ENG 1061

HUM 4010 East & West Holistic Healing (3) **as required**

This course introduces the student to holistic healing; complementary and alternative therapies; energy and elemental work; multicultural perspectives; and traditional healers. They understand, evaluate, and appreciate traditional holistic models of health and healing, as well as complementary and alternative therapies, and learn and apply at least one chosen modality in their healing work.

3 hours of online lecture per week Prerequisite: ENG 1061

Interdisciplinary (INT)

INT 1005 Self, Career, & Culture (3) spring

This course designed for freshman investigates the relationships between individuals, their careers, and the social environments in which they live. The course explores the interactions between self and society and helps to explain the nature of the individual as a student; the nature and impact of the student's program on society; the relationship among educational disciplines and society; the role of the individual and the student's career in society; and the responsibilities of citizenship.

3 hours of lecture per week

INT 1021 Creativity & Innovation (3) fall

In this course, the student learns techniques for improving the flexibility and originality of their thinking and explores approaches used by managers and organizations to create and sustain high levels of innovation. Topics include personal thinking preferences; everyday creativity and eliminating mental blocks; creative thinking techniques; idea selection approaches; teaming techniques for creativity; conditions that promote creativity; design for interaction; disruptive technologies; and intellectual property. The course uses fun hands-on activities to stimulate innovation.

3 hours of lecture per week

Landscape (LAH)

LAH 1020 Introduction to Horticulture (3) fall

This survey course introduces the principles and practical applications of horticulture. The student becomes familiar with the basic science that forms the foundation of horticulture and uses this information to understand how horticulture is applied. Topics include fields of horticulture; plant classification; plant structures; plant physiology and development; plant environments; plant propagation; and crop improvement.

3 hours of lecture per week

LAH 1021 Landscape Graphics (2) fall

This course familiarizes the student with a broad range of graphic techniques and specific tools necessary for each. Coursework includes freehand drawing; an introduction to mechanical, technical, and computer aided drafting; the conventions of landscape/architectural drawing, including its intentions, capabilities, and use (i.e., a thorough understanding of plan, section, and elevation); three-dimensional drawing techniques: axonometric and perspective (both constructed and freehand); tonal value and texture rendition; shade and shadow; and architectural lettering.

4 hours of studio per week

LAH 1030 Woody Ornamentals (3) fall

This course covers the identification of approximately one hundred native and cultivated woody plants found in northern New England and explores plant nomenclature; plant characteristics and requirements (environmental, cultural, and design/ornamental); plant associations; and horticultural and planting design issues with emphasis on both plant identification and plant selection. Drawing as part of learning is encouraged. Offered every other year.

2 hours of lecture, 3 hours of lab per week

LAH 1031 CAD for Landscape Applications (2) spring

This course introduces CAD as a drafting, documentation, production, and presentation tool for landscape design. The student explores software applications such as Photoshop, InDesign, Illustrator, and SketchUp. Specific coursework covers topics such as photo overlay; manipulation; layout; file management; image management and interpretation; composition; and presentation drawings. All work builds upon foundational understanding of digital files, organizational systems, and protocols.

3 hours of studio per week — Prerequisite: LAH 1021

LAH 1040 Greenhouse Management (3) spring

This course covers the fundamentals of commercial greenhouse production, control of the greenhouse environment, and effects on plant growth. Topics include greenhouse construction; heating and cooling; growing media; fertilization; watering; pest control; and the production of container-grown crops.

2 hours of lecture, 3 hours of lab per week

LAH 1050 Introduction to Soils (4) spring

This course covers soil formation and classification and the ways in which chemical, physical, and biological properties of soil affect plant growth. It examines issues related to soil temperature, aeration, organic matter, and tilth. It explores practices best suited to erosion control and nutrient management. The student learns about soil testing and the most effective liming and fertilizing practices for sustainable management. The college, home gardens, and local farms are used in soil and fertilizer analysis.

3 hours of lecture, 2 hours of lab per week

LAH 2010 Landscape Construction Practices (3) fall

This course introduces the materials and methods of landscape construction and management with emphasis on how general intentions develop at the plan and detail level, resolve through sound principles of construction, and are professionally documented according to conventional standards. Coursework includes

surveying; map-making; construction of freestanding retaining walls, patios, and walkways; grading earthworks; and the principles of statics and mechanics as they apply to landscape design.
6 hours of studio per week — Prerequisite: LAH 2011
[Course fee: $20] — Corequisite: LAH 1050

LAH 2011 Introduction to Landscape Design (2) **spring**
This course introduces the basic principles of landscape design to build a fundamental knowledge of and fluency in the issues and language of landscape design and its application. The coursework is a progression of basic design principles that build to an increasingly sophisticated understanding of design and its application with a strong emphasis on the interrelatedness of architectural and landscape built form. It emphasizes verbal and graphic communication of ideas and solutions. Individual design projects are developed under faculty supervision and are presented to a jury of faculty and distinguished practitioners. The student receives an overview of landscape architectural history and examines the work of practitioners in the field.
4 hours of studio per week — Prerequisite: ARE 1210 or CPM 1021 or LAH 1021
[Course fee: $10]

LAH 2020 Plant Propagation (3) **fall**
This course presents the principles that explain and control plant propagation. Propagation by seeds, cuttings, grafting, layering, and other common methods is explored in the lab with emphasis on the newest technologies, including tissue culture.
2 hours of lecture, 3 hours of lab per week — Prerequisite: LAH 1020
[Course fee: $10]

LAH 2030 Herbaceous Plant Materials (3) **fall**
This course familiarizes the student with approximately one hundred and twenty five herbaceous plants including perennials, annuals, biennials, bulbs, and turfgrass with emphasis on identification; aesthetic and functional use in the landscape; plant culture and maintenance; transplanting; and plant design and composition. Offered every other year.
2 hours of lecture, 3 hours of studio per week

LAH 2730 Landscape Contracting Seminar (2) **spring**
This course helps the student to develop the attitudes and skills essential to career success and acts as a capstone course with a focus on running a successful landscape business. They concentrate on creating a portfolio and working on a project that begins with a design/proposal; includes research into specific zoning regulations and bylaws; follows through with a complete set of takeoffs, estimates, bids, specifications, and short and long form proposals; and ends with a presentation to the client.
2 hours of studio per week

LAH 2802 LAH Summer Internship Review (1) **fall**
This is the review portion of a summer internship. Pass/No Pass.
[Course fee: $250]

Mathematics (MAT)

MAT 1210 Principles of Mathematics (3) **as required**
This course reviews general math principles and introduces concepts for the solution of agricultural and business problems. Topics include calculator use; basic algebraic operations, solution of linear and quadratic equations; geometry concepts of line, area, and volume; variation; trigonometry of right triangles; growth; compound interest; debt amortization; probability; and statistics.
3 hours of lecture per week — Prerequisite: Placement level 2

***MAT 1221 Finite Mathematics* (3)** **fall/spring**
This course introduces a variety of mathematical tools to solve applied problems. Topics may include functions; graphing; linear models; matrices and linear systems of equations; linear programming; exponential models; elementary probability and statistics; and the mathematics of finance.
3 hours of lecture per week — Prerequisite: Placement level 3 or MAT 1210 with a *C*- or better

MAT 1311 Precalculus I (3) **fall/spring**
This course stresses the relation of mathematics to engineering applications and the importance of precision in mathematical thought. It covers the use of a graphing calculator; basic geometry; solutions of linear and quadratic equations; right triangle trigonometry; algebraic fractions; and solving logarithmic and exponential equations.
3 hours of lecture per week — Prerequisite: Placement level 4 or MAT 1210 with a *C*- or better

MAT 1312 Precalculus II (3) **as required**
This course is a continuation of MAT 1311 that covers algebraic fractions; exponents and radicals; proportions and variations; trigonometric functions; law of sines and cosines; vectors; operations with complex numbers; trigonometric identities and equations; and graphs of the trigonometric functions.
3 hours of lecture per week — Prerequisite: MAT 1311

MAT 1420 Technical Mathematics (5) **fall/spring**
This course stresses the relation of mathematics to engineering applications and the importance of precision

in mathematical thought. It covers the use of a graphing calculator; solutions of linear and quadratic equations; exponents and radicals; logarithms; exponential functions; right triangle trigonometry; laws of sines and cosines; vectors; operations with imaginary numbers; trigonometric identities and equations; and graphs of the trigonometric functions.
5 hours of lecture per week — Prerequisite: Placement level 4 or MAT 1340 with a *C-* or better

MAT 1440 Applied Mathematics for Health Sciences (3) — **as required**
This course presents basic concepts needed for success in the applied health sciences. Topics include basic arithmetic; percentages; ratio and proportion; geometry; unit conversions; dosage and concentration applications; dilution and infusion rates; basic graphing techniques; and basic algebra.
3 hours of lecture per week — Prerequisite: Placement level 2

MAT 1520 Calculus for Engineering (4) — **as required**
This course presents basic concepts of plane analytical geometry and calculus. Topics include differentiation and integration of algebraic, trigonometric, exponential, and logarithmic functions with emphasis on technical applications; maximum and minimum word problems; related rates; and applications of the integral to include area and volume.
4 hours of lecture per week — Prerequisite: Placement level 5 or MAT 1420 with a *C-* or better

MAT 2021 Statistics **(3)** — **as required**
This course introduces the basic ideas and techniques of probability and statistics. Topics include numerical and graphical descriptive measures, probability, random variables, the normal distribution, sampling theory, estimation, hypothesis testing, correlation, and regression.
3 hours of lecture per week — Prerequisite: Placement level 3 or MAT 1210 with a *C-* or better

MAT 2120 Discrete Structures (3) — **spring**
This course introduces discrete structures in computer science and covers topics such as sets, set logic, relations, functions, proof techniques, induction, logic, graphical representations, and algorithms.
3 hours of lecture per week — Prerequisite: Placement level 3 or MAT 1210, 1221, or 1311 with a *C-* or better

MAT 2532 Calculus II **(4)** — **as required**
This course includes techniques and applications of integration, indeterminate forms, and improper integrals, sequences, and series.
4 hours of lecture per week — Prerequisite: MAT 1520 with a *C-* or better

MAT 2533 Calculus III **(4)** — **fall/spring**
Topics in this course include the calculus of vector-valued functions; tangent and normal vectors; velocity; acceleration and applications; functions of several variables; partial derivatives; gradients; extreme values and applications; and multiple integration. Additional topics may include line and surface integrals; parametric surfaces; the theorems of Gauss, Green, and Stokes; and differential equations.
4 hours of lecture per week — Prerequisite: MAT 2532 with a *C-* or better

MAT 3170 Applied Mathematics for Engineering (3) — **spring**
This course introduces topics of advanced mathematics and applies them to areas of electrical and mechanical engineering analysis. Content includes key methods of solution of both first- and second-order differential equations that are most useful in engineering analysis, Laplace transforms, and numerical methods of solution. The student models electrical and mechanical systems and predicts their outputs using systems of integral and differential equations.
3 hours of lecture per week — Prerequisite: MAT 2532 with a *C-* or better

MAT 3720 Topics in Discrete Mathematics (3) — **spring**
This course introduces fundamental topics in discrete mathematics that offer theoretical support for a variety of computer applications. Applications such as algorithm development and analysis, error analysis, and data encryption are best understood with a foundation in logic and writing proofs, set theory, combinatorics, probability, number theory, and abstract algebra.
3 hours of lecture per week — Prerequisite: MAT 2532 or MAT 1312 and 2120 or MAT 1520 with a *C-* or better

Mechanical Engineering Technology (MEC)

MEC 1010 Introduction to Mechanical Engineering Technology (1) — **fall**
This course introduces the student to the organization, analysis, and presentation of data related to mechanical engineering technology and gives an overview of careers in the field. The primary focus is on software applications designed for organizing and formatting information; performing numerical and graphical analysis; and technical presentation, including Excel, Word, and PowerPoint. The student explores various topics (materials properties, energy, strength, and forces) through exercises where information and numerical data are acquired, organized, analyzed, and presented.
2 hours of studio per week

MEC 1011 Design Communication I (2) — **fall**
This course provides a basic understanding of the principles and technology of mechanical drawing and computer modeling as methods of documenting and communicating mechanical designs. It covers the concepts of geometric construction and orthographic, sectional, auxiliary, and assembly views and introduces dimensioning methods and types of fasteners. The student gains basic proficiency in using a solid paramet-

ric three-dimensional CAD program to build parts, assemblies, and detailed working drawings.
6 hours of studio per week
[Course fee: $45]

MEC 1012 Design Communication II (2) **spring**
Parametric, three-dimensional solid modeling is the premiere design tool used around the world to create innovative product designs. This course develops the techniques necessary to model complex parts, surfaces, and assemblies with emphasis on using design tables and parametric databases to develop part and feature libraries. It pays special attention to creating models and assemblies that can be easily modified and changed and introduces kinematic, dynamic, and finite element analysis techniques. The skills and techniques taught in this course are transferable to any parametric, three-dimensional design software.
6 hours of studio per week Prerequisite: MEC 1011
[Course fee: $45]

MEC 1020 Manufacturing Processes I (2) **fall/spring**
This hands-on course with a strong focus on safety and skilled operation introduces the student to a wide variety of manufacturing processes. Although heavily focused on traditional machine tools (lathes, mills, grinders, etc.), it also explores the processes of casting, welding, molding, and industrial cutting (plasma, water-jet, laser). The student works in a small group to produce functional products using today's manufacturing standards.
1 hour of lecture, 3 hours of lab per week
[Course fee: $50]

MEC 1040 Introduction to Materials Science & Engineering (3) **spring**
This course introduces the nature and properties of materials that are used in engineering applications. Materials are studied from the perspective of properties, processing, and structure and how they're interrelated. Topics common to all materials are covered, including crystalline structure, mechanical behavior, and property testing. Topics related to metals include defects, phase formation, heat treating, the steel system, and alloy systems. It also covers the properties and structure of ceramics, polymers, and composites.
2 hours of lecture, 3 hours lab per week Prerequisite: PHY 1041
[Course fee: $20]

MEC 1060 Metrology & Inspection Techniques (3) **fall**
This course explores the fundamental concepts of modern dimensional metrology and related inspection techniques. Topics include the language and system of measurement; tolerances; metrology; statistics of metrology; measurement with graduated scales and scaled instruments; Vernier instruments; micrometer instruments; the development and use of gage blocks; measurement by comparison and high-amplitude comparators; pneumatic measurement; and calibration.
2 hours of lecture, 3 hours of lab per week
[Course fee: $15]

MEC 1070 Tool Geometry & Productive Metal Cutting (2) **as required**
This course presents the theory and practical applications of modern cutting-tool technology and equips the student to recognize and define the various geometries associated with cutting tools and how they relate to the material and manufacturing process.
1 hour of lecture, 3 hours of lab per week

MEC 1180 Introduction to Welding Processes (3) **as required**
This course covers the fundamentals of oxyacetylene brazing, welding, and cutting processes; Shielded Metal Arc Welding (SMAW or stick); Gas Metal Arc Welding (GMAW or MIG); and Gas Tungsten Arc Welding (GTAW or TIG) and plasma cutting processes. It prepares the student for American Welding Society entry-level certifications. A major component of the lab is safety.
2 hours of lecture, 3 hours of lab per week
[Course fee: $450]

MEC 1190 Advanced Welding Processes (2) **as required**
This course allows the student to pursue advanced welding techniques that lead to AWS pre-certification skills. The student learns blueprint reading for welders and the application of required national codes. Safety, liability, and business ethics are significant elements of this course.
1 hour of lecture, 3 hours of lab per week Prerequisites: MEC 1180
[Course fee: $450]

MEC 2010 Fluid Mechanics & Fluid Systems (3) **fall**
This course examines the interrelationships between the nature of fluid properties; the behavior of fluids at rest and in motion; and the utilization of fluids to effectively accomplish a wide range of useful purposes. Lab experiences develop a working knowledge of fluid properties, fluid behavior, and fluid systems for power transmission and control.
2 hours of lecture, 3 hours of lab per week Prerequisite: MEC 1010; PHY 1041
[Course fee $20] Corequisite: MAT 1520

MEC 2035 Statics & Strengths of Materials (4) **fall**
This course focuses on two related topics: the analysis of mechanical systems under static load conditions

and the resulting stress in the structures and materials. It follows introductory physics and emphasizes problem-solving skills while addressing commonly used structures and mechanisms. It begins with the analysis of forces and moments on static structures and mechanisms and then applies the methods of statics to analyze the stresses and strains in material structures due to tension, compression loads, shearing, and bending. The student uses stress analysis to evaluate material strength and design limitations of structures and mechanisms.
3 hours of lecture, 3 hours of lab per week — Prerequisite: MEC 1011; PHY 1041
[Course fee: $20] — Corequisite: MAT 1520

MEC 2040 Computer-Aided Technology (2) **fall**
In this course, the student learns G-code programming of machine tools and learns to use computer-aided manufacturing software to generate toolpaths, which are then translated into G-code programs. CNC machine tool set-up and operation are key components and CAD software is used extensively. Other technologies, such as waterjet, laser cutter, and additive manufacturing, may be covered.
1 hour of lecture, 3 hours of lab per week — Prerequisite: MEC 1011, 1020
[Course fee: $85]

MEC 2050 Thermodynamics & Heat Transfer (4) **spring**
This course familiarizes the student with the first and second laws of thermodynamics, the equations of state, perfect gas processes, and various power cycles and they develop some skill in applying these principles to the analysis of devices which utilize the power cycles such as the Otto, Diesel, Rankine, and vapor-compression cycles. Topics include conduction, convection, and radiation heat transfer.
3 hours of lecture, 3 hours of lab per week — Prerequisite: MAT 1520; MEC 2010; PHY 1041
[Course fee $20]

MEC 2065 Kinematics & Dynamics (3) **spring**
In dynamic systems where objects and mechanical assemblies are moving, the accelerations and velocities are considered in order to analyze the motion and forces on an object. The student in this course acquires a thorough understanding of the displacement, velocity, acceleration, and force characteristics of plane motion and the associated graphical and computer-aided methods of analysis.
2 hours of lecture, 3 hours of lab per week — Prerequisite: MAT 1520; MEC 1011; PHY 1041
[Course fee $30]

MEC 2070 Machine Design Components (3) **as required**
This course familiarizes the student with the various types of machine elements that are used in mechanical design and helps them understand the design intent based on functionality, strength, and durability.
2 hours of lecture, 3 hours of lab per week
[Course fee $150]

MEC 2071 Machine Design (2) **spring**
In this course, the student examines the application of mechanical parts such as screws, gears, shafts, bearings, chains, belts, clutches, and brakes to the design of mechanical devices.
2 hours of lecture per week — Prerequisite: MEC 2035
Corequisite: MEC 2065

MEC 2150 Introduction to Solar Photovoltaic Technology (3) **spring**
This course introduces the basics of solar photovoltaic (PV) technology, including solar resource assessment; PV materials and modules; systems components; system sizing and design basics; mechanical mounting systems; installation methods; and performance analysis. It also discusses advanced topics current to the industry and prepares the student to take the NABCEP PV Solar Entry-Level Knowledge Certificate exam.
2 hours of lecture, 2 hours of lab per week — Prerequisite: ELT 1031
[Course fee $100]

MEC 2720 Mechanical Projects (3) **spring**
In this capstone course, the student examines the application of mechanical parts such as screws, gears, shafts, bearings, chains, belts, clutches, and brakes to the design of mechanical devices. A central component of the course is a team-based project to design and fabricate a mechanical system.
2 hours of lecture, 3 hours of lab per week — Prerequisite: MEC 2010, 2035, 2040
[Course fee: $95] — Corequisite: MEC 2050, 2065

MEC 3010 Wind Power (3) **fall**
This course introduces the concepts of wind power and associated technology. Topics include the principles of wind energy and resource assessment; rotor and blade designs; the mechanical and electrical principles of wind turbine systems; types of applications; and the economics and current policies related to wind power. The lab covers the installation of anemometry equipment and data evaluation; fabrication and testing of simple rotors; turbine systems; and monitoring and evaluation of installed systems.
2 hours of lecture, 2 hours of lab per week — Prerequisite: PHY 1041
[Course fee $25]

MEC 3021 Manufacturing Processes II (3) **fall**
This course scrutinizes the theory and practical applications of modern cutting-tool technology. The student learns to recognize and define the various geometries associated with cutting tools and how they relate to

the material and manufacturing process.
1 hours of lecture, 4 hours of lab per week — Prerequisite: MEC 1011, 1020, 1040, 2040
[Course fee $75]

MEC 3031 Materials Processes (3) **fall**
This course focuses on the processes by which materials are economically processed into different shapes. The student understands the principles and practical knowledge of different materials processes and applies that knowledge when considering the geometry, functionality, and materials required for a product. Topics include processes for metal, polymers, and ceramics; machining, casting, forming, joining, sheet metal, extrusion, additive methods (3D printing), and coating processes.
2 hours of lecture, 3 hours of lab per week — Prerequisite: MAT 1520; MEC 1020, 1040; PHY 1042
[Course fee $75]

MEC 3040 Bioenergy (3) **fall**
This course examines bioenergy technologies designed to replace fossil fuel-based heating systems and contribute to the production of renewable energy. It introduces solid, liquid, and gaseous biofuels, though focus is on biomass and anaerobic digestion. Topics include feedstock resources, processing, and characterization methods; systems for energy conversion by combustion/oxidation; policy; permitting; transportation; economics; nutrient recovery; carbon cycling; and life cycle analysis. Case studies focus on systems installed in Vermont. Successful completion of lab chemistry is recommended.
2 hours of lecture, 2 hours of lab per week — Prerequisite: PHY 1041; SSC 2030
[Course fee $15]

MEC 3041 Advanced CNC Machining (3) **spring**
In this course, the student gains expertise in G-code programming, use of professional computer-aided manufacturing software, and using and operating CNC machine tools. Topics include manufacturing procedures; orders of operation; tooling and operation selection; safety hazards; material considerations; machine setup; and fixtures.
1 hour of lecture, 4 hours of lab per week — Prerequisite: MEC 2040
[Course fee $135]

MEC 3120 Advanced Manufacturing & Automation (3) **spring**
This course explores the mechanical aspects of machines and the associated electronic, pneumatic, and fluid-powered components that work together for automated manufacturing and production control including drive mechanisms for feeds, speeds, and power utilization for each component in the manufacturing line such as conveyors, robotic arms, PLCs, machine tools, and workstations. It incorporates the variability in products manufactured in relationship to the equipment capacities. The student learns computer simulation and engages in hands-on production set-ups as well as automated visual and tactile inspection techniques that guarantee product quality. Each mechanism applies the learned aspects to the specifications, functions, and safe operation associated with modern advanced manufacturing. Emphasis is on effective workplace skills including teamwork, problem solving, integrity, and dependability. FANUC robotic arm certification is optional.
1 hour of lecture, 4 hours of lab per week — Prerequisite: MEC 2040
[Course fee $85]

MEC 3121 Additive Manufacturing (3) **spring**
In this course, the student gains expertise in Additive Manufacturing (AM) technologies and the use of applicable AM computer-aided design and computer-aided manufacturing software tools. Additionally, Design for AM, including topics such as part integration, conformal cooling, and topological optimization, is introduced and applied. The impact of AM on traditional business and manufacturing processes is discussed and analyzed. The student applies all of this knowledge to practical problems and produces actual AM components.
2 hours of lecture, 3 hours of lab per week — Prerequisite: MEC 1011, 1040
[Course fee $75]

MEC 3170 Renewable Energy Heating (3) **spring**
This course provides an overview of heating systems that utilize solar, biomass, and geothermal energy. Topics include the principles of each type of technology; hydronic heating; system sizing; pumps and circulators; heat exchangers and storage tanks; sensors and controllers; plumbing components; integration; and performance analysis.
2 hours of lecture, 2 hours of lab per week — Prerequisite: ARE 2031; PHY 1042
[Course fee $25] — Corequisite: ARE 3050 or MEC 2050

MEC 4010 Lean Manufacturing (3) **spring**
This course develops proficiency in the methods and processes used for lean manufacturing with a focus on understanding lean principles, practices, and techniques from both a technical standpoint and a people perspective, which is needed in order to effectively lead an organization to lean operation and sustain improvements. Topics include the continuous recognition and elimination of waste in operations and reducing time from order to delivery while maintaining or improving product quality.
3 hours of lecture per week — Prerequisite: MAT 2021
[Course fee: $15]

MEC 4020 Quality Assurance (3) **fall**

This course examines the principles and methods of quality assurance including measurement, control, improvement, and management, focusing on applications in the manufacturing field. It introduces basic definitions; statistics; quality policy and objectives; manuals and procedures; concept of variation; inspection and sampling techniques; metrology process control; methods; and the elements of reliability and reviews current TQM and ISO 9000 standards.

3 hours of lecture per week — Corequisite: MAT 2021

MEC 4120 Renewable Energy Modeling (3) **fall**

This course focuses on methods and tools used for modeling the performance of renewable energy systems. Topics include physical modeling of solar, wind, and bioenergy technologies; using resource data in modeling renewable energy systems; and using commercial tools for performance prediction.

1 hour of lecture, 4 hours of lab per week — Prerequisite: MAT 1520, 2021; MEC 2150, 3170

[Course fee: $45] — Corequisite: MEC 3010, 3040

MEC 4220 Product Design & Production (3) **fall**

This course focuses on product design, advanced manufacturing, and production processes. Topics include concurrent and reverse engineering methods; advanced metrology; automation in manufacturing; abrasive and grinding techniques; water jet machining; 3D printing; and other emerging methods. The student engages in a variety of individual and team-based projects that allow them to expand upon their prior manufacturing and materials processing knowledge and experience while developing marketable workforce skills in advanced manufacturing. As the final project for this course, the student designs, develops, manufactures, markets, and sells a consumer product with the goal of making a profit.

1 hour of lecture, 4 hours of lab per week — Prerequisite: MEC 3041 or 3121

[Course fee: $95] — Corequisite: MEC 1060, 3021, 3031, 3120, 4020

MEC 4721 Manufacturing Capstone Project (3) **spring**

This required capstone course for the Manufacturing program provides an opportunity to apply a combination of skills and knowledge to solve an industrial or real-world manufacturing problem. The student works in a group to tackle an integrated, technical problem presented by regional industry and approved by program faculty. Topics include manufacturing materials and processes, design, quality, lean manufacturing, and automation.

1 hour of lecture, 4 hours of lab per week — Prerequisite: MEC 1060, 3021, 3031, 3120, 4020, 4220

[Course fee: $120] — Corequisite: MEC 3041, 3121, 4010

MEC 4722 Renewable Energy Capstone Project (3) **spring**

In this course, the student applies knowledge and skills to a project that addresses a renewable energy system or process problem. This capstone project may involve engineering design; scientific research; modeling and simulation; policy and regulations; economic analysis; environmental analysis; operations and management planning; or other activities. If possible, the work is done in a team and includes identifying project scope and specifications; researching and proposing a technical solution; completing a design or process plan that addresses the problem; and communicating through oral and written reports.

1 hour of lecture, 4 hours of lab per week — Prerequisite: MEC 4120

[Course fee: $50]

MEC 4802 MEC Internship Review (1) **fall**

This course reviews the activities and responsibilities that the student experienced in a summer internship to award credit for completed work. Pass/No Pass.

Music (MUS)

MUS 1028 Introduction to Rock & Roll **(3)** **as required**

In this course, the student discusses the social, economic, and political conditions that influenced the development of rock music and the artists who contributed to its form. They explore a variety of rock styles from the 1950s through the present through extensive listening.

3 hours of lecture per week

Nursing (NUR)

NUR 0111 Principles & Practices of Nursing I Lab (4) **fall**

This is the lab component of NUR 1111. Pass/No Pass.

12 hours of clinic/lab per week

[Course fee: $70] — Corequisite: NUR 1111

NUR 0121 Principles & Practices of Nursing II Lab (4) **winter**

This is the lab component of NUR 1121. Pass/No Pass.

12 hours of clinic per week — Prerequisite: NUR 0111, 1020, 1111

[Course fee: $70] — Corequisite: NUR 1121

NUR 0131 Principles & Practices of Nursing III Lab (4) **spring2**

This is the lab component of NUR 1131. Pass/No Pass

18 hours of clinic per week — Prerequisite: NUR 0121, 1010, 1121; PSY 1050

[Course fee: $70] — Corequisite: NUR 1131

NUR 1010 Pharmacology for Nursing (3) **winter**

This course teaches the classifications of drugs according to body systems and the use of these drugs for the purpose of restoring or maintaining health. It begins with basic terminology and progresses to medication administration and standards and legislation as they relate to drugs. Topics include the role of the nurse, the nursing process, nutrition, and principles of ethics. A basic study of pharmacokinetics explores how drugs are absorbed, transported, metabolized, and excreted. A review of pharmacotherapeutics focuses on how drugs are used by the human body and how the client's age and unique characteristics affect this process. Orem's theory is integrated into practical application based on a client's needs.

3 hours of lecture per week — Prerequisite: NUR 0111, 1020, 1111
Corequisite: BIO 2012

NUR 1020 The Nurse-Client Relationship (3) **fall**

This course delves into the human relations challenges encountered in a nursing career and implements the philosophy and objectives of the program by stressing the importance of Orem's self-care deficit theory for the psyche as well as the body. It presents basic principles, concepts, and information regarding communication, listening, and assertiveness to stress the importance of confidentiality and ethical behavior as part of the interdisciplinary team. Additional presentations include the community; the family; cultural diversity; sexual harassment; death and dying; and the impaired professional. Discussions encourage the student to broaden their views and develop an awareness of the uniqueness of humanity.

3 hours of lecture per week — Corequisite: NUR 0111, 1111

NUR 1111 Principles & Practices of Nursing I (5) **fall**

This course provides the selected knowledge and skills necessary to meet the basic self-care needs of the assigned client in both long-term and acute care settings. It focuses on application of the nursing process in the care of clients with self-care deficits and emphasizes data collection and the role of the practical nurse in the recognition, description, and maintenance of health. Orem's self-care deficit theory is integrated into practical application during lectures and in NUR 0111. Additional topics include the roles of various healthcare team members, concepts of effective communication, and effective maintenance of a safe and therapeutic environment.

5 hours of lecture per week — Corequisite: BIO 1030, 2011; NUR 0111, 1020
[Course fee: $100]

NUR 1121 Principles & Practices of Nursing II (5) **winter**

In this course, the student builds upon their knowledge and skills to provide safe, competent, standard nursing interventions to clients experiencing recurring healthcare problems in acute and long-term care settings. They learn to care for groups of clients utilizing the nursing process to organize and implement nursing care and they select appropriate goals to meet the client's self-care needs, demonstrating an increasing ability to perform standard nursing interventions in the clinical environment with decreasing need for supervision. Observational experiences are provided in certain specialty areas.

5 hours of lecture per week — Prerequisite: BIO 1030; NUR 0111, 1020, 1111
[Course fee: $100] — Corequisite: BIO 2012; NUR 0121, 1010; PSY 1050

NUR 1131 Principles & Practices of Nursing III (5) **spring2**

This course explores integrative concepts in nursing and in the developing family. The student expands their knowledge and increases the skills necessary to meet the self-care deficits of individuals experiencing common healthcare problems, with emphasis on parent/child care and mental health. They learn through selected clinical experiences in obstetric, pediatric, and medical-surgical settings in addition to the nursing lab. They also use the nursing process to demonstrate skills in problem solving with a focus on implementation and evaluation of nursing care.

8.3 hours of lecture per week — Prerequisite: BIO 2012; NUR 0121, 1010, 1121; PSY 1050
[Course fee: $100] — Corequisite: NUR 0131

NUR 2010 LPN to RN Transition/Trends in Nursing (2) **fall**

In this course, the student learns to recognize personal and professional challenges that arise as they transition from practical nurse to registered nurse. They evaluate and analyze issues and trends important to contemporary nursing and apply theories regarding the transition process, role development, and the process of change to personal adaptation, professional issues, and role differentiation in terms of responsibilities and scopes of practice. They examine current issues through assigned reading, written submissions, and lively discussions and ultimately develop an individual philosophy of differentiated nursing practice.

2 hours of lecture per week — Corequisite: NUR 2040

NUR 2011 Advanced Pharmacology (1) **spring**

This course builds on NUR 1010 and presents a body-system-oriented approach to analyzing the use of particular medications for complex medical/surgical conditions in clients across the lifespan. The student integrates and evaluates the effectiveness of each client outcome as it relates to their pharmacological needs.

1 hour of lecture per week — Prerequisite: NUR 2040
Corequisite: NUR 2140

NUR 2030 Principles & Practice of Nursing IV (3) **fall**

This course is divided into three content areas: health promotion and physical assessment; psychiatric nursing; and maternity nursing. The health promotion and physical assessment portion of the course focuses on assessing abnormal conditions, encouraging a maximum level of self-care by promoting healthy behaviors,

and the importance of an accurate and complete health history (including a psychosocial, cultural, and spiritual assessment) and a health risk appraisal. In the psychiatric nursing portion, the student assesses, plans, and evaluates interventions in the care of the client population, selects an appropriate role to assume, and assists clients to meet their mental health self-care needs. Topics in the maternity portion include assessment, evaluation, planning care, and implementing interventions for normal and abnormal antepartal, intrapartal, and postpartal client at the level of the registered nurse. The student assists the maternity client and family to recognize their self-care needs.
3 hours of lecture per week
[Course fee: $100] Corequisite: NUR 2010, 2040

NUR 2040 Principles & Practices of Nursing IV Lab (2) fall
Lab and clinical experiences reflect the material presented in NUR 2030. The student assists the client and family to recognize self-care needs. They assess, plan, and evaluate interventions in the care of client populations in general medicine, maternity, and mental health settings. Multiple inpatient and outpatient areas provide observational experiences for them to demonstrate skills in decision-making through the use of the nursing process with an emphasis on implementation and evaluation and select the appropriate roles to assume in meeting the patient's self-care needs. They perform therapeutically in the clinical area with decreasing need for instructor supervision. Pass/No Pass.
6 hours of clinic per week
[Course fee: $70] Corequisite: NUR 2030

NUR 2130 Principles & Practices of Nursing V (6) spring
This course presents patients across the lifespan who are experiencing complex acute medical/surgical illnesses and chronic self-care deficits. Observational experiences are provided in multiple areas such as intensive care, the emergency room, the recovery room, clinics, and home health agencies. The student demonstrates skills in decision-making through the use of the nursing process with an emphasis on implementation and evaluation and selects the appropriate roles to assume in meeting the patient's self-care needs.
6 hours of lecture per week Prerequisite: BIO 2120; NUR 2040
[Course fee: $330] Corequisite: NUR 2140

NUR 2140 Principles & Practices of Nursing V Lab (4) spring
Lab and clinical experiences reflect the material presented in NUR 2130. The student performs therapeutically in the clinical area with decreasing need for instructor supervision. Pass/No Pass.
12 hours of clinic per week Prerequisite: NUR 2040
[Course fee: $70] Corequisite: NUR 2011, 2130

NUR 3100 RN to BSN: Online Transition (1) as required
This is the first class in the progression to the BSN program and includes orientation to the program; orientation to the library and student resources; discussion and use of effective online communication and netiquette; and development and presentation of baccalaureate-level presentations.
2 hours of online lecture per week for 7.5 weeks

NUR 3110 Nursing Informatics (3) as required
This course presents ethics, safety, research, professional networking, telemedicine, and the future of informatics in nursing. The student understands the ways information technology supports the acquisition of nursing knowledge with specific consideration given to the nursing role as a knowledge worker and appreciates the application of nursing informatics in achieving patient-centered care.
6 hours of online lecture per week for 7.5 weeks Corequisite: NUR 3100

NUR 3120 Palliative & End-of-Life Care (3) as required
This course examines pain control, symptom management of various organ systems, and therapeutic communication with patients and their families. It details collaborations with ancillary teams and options for non-medicinal approaches to symptom management. Through a series of case studies and online discussions, the student role plays encounters and details interventions in complex cases using current evidence-based practices.
6 hours of online lecture per week for 7.5 weeks Corequisite: NUR 3100

NUR 3121 Transitions of Care in Healthcare Reform (3) fall
This course teaches practicing nurses to effectively coordinate patient care transitions between care providers and settings as condition and care needs change. Online and observational experiences bridge the gap between providing nursing care in single settings to coordinating care across settings. Topics include health care reform; nursing role evolution and transformation; risk identification; care coordination; data measurement; and quality improvement. The student examines care transition models including evidence-based methods and tools used by hospitals and community agencies to facilitate effective care transitions. Emphasis is on patient-centric care provided through effective communication and care coordination among healthcare professionals, caregivers, and patients.
6 hours of online lecture per week for 7.5 weeks Prerequisite: NUR 3100

NUR 3140 Pathophysiology & Assessment (4) as required
This course refines the student's physical assessment skills, focusing on the assessment differences needed to recognize abnormal findings across the lifespan, especially with at-risk populations, and introduces the

basic concepts of pathophysiology. The student explores communication, health histories, and psychosocial impacts in the development of holistic health assessment skills and examines the phenomena that produce alterations in human physiologic function and the resulting responses.

4 hours of online lecture per week — Prerequisite: BIO 2012
Corequisite: NUR 3110

NUR 3210 Healthcare Systems (3) — **fall/spring**

This course scrutinizes the ways that healthcare is delivered with emphasis on cost, access, outcomes, and the impact of globalization. The student explores the role of the nurse within the healthcare delivery system and in relation to other members of the healthcare team and explores the healthcare disparities in the US. They examine the history of American healthcare delivery, evaluate the efficacy of this system, and articulate a vision of healthcare delivery that examines the contributions of nursing professionals.

6 hours of online lecture per week for 7.5 weeks — Corequisite: NUR 3100

NUR 4011 Teaching/Learning in Healthcare for Allied Health (3) — **spring**

This course provides the student with the ability to recognize the teaching and learning needs of their patients in accordance with the philosophic and historical practice of providing patient education.

6 hours of online lecture per week for 7.5 weeks — Prerequisite: NUR 3110

NUR 4012 Health Promotion Across the Lifespan (3) — **spring**

This course focuses on the role of the nurse in promoting health and reducing risk behaviors of individuals and families across the lifespan. It examines examples of nutrition, physical activity, and stress management with emphasis on the impact of genetics, values, lifestyle, and environmental and cultural influences. The course emphasizes collaboration with other healthcare providers; integration of practice and policy while developing interventions; and patient teaching as essential functions of the nurse.

6 hours of online lecture per week for 7.5 weeks — Prerequisite: NUR 3100, 3110, 3140; NUR 3120 or 3121,
Corequisite: NUR 3210; PSY 3070

NUR 4110 Research & Evidence-Based Practice (4) — **spring**

Nursing is an art and a science which uses evidenced-based practices. This course analyzes the process of evidence-based practice, which is defined as the synthesis of scientific evidence, clinical judgment, patient preferences, and available resources. The student formulates clinical questions, performs database searches, appraises retrieved evidence, and develops a quality improvement project on a topic of interest.

4 hours of online lecture per week — Prerequisite: MAT 2021; NUR 3100

NUR 4130 Nursing Leadership & Management (6) — **fall/summer**

This course prepares the student to assume nursing leadership and management roles with focus on their interactions with healthcare team members. It familiarizes them with management theories; organizational and behavior theories; and leadership styles that are relevant to the practice of nursing management, explores the elements of the management process, and changes management strategies and their applications. It enhances the student's leadership skills in maintaining best practices and standards of care utilizing nursing units in hospitals as a framework for the application of the theories and knowledge base.

6 hours of online lecture and preceptorship per week — Prerequisite: NUR 3110

NUR 4210 Global Health & Population-Based Healthcare (3) — **fall/spring**

There's a great need for nurses who understand global connectedness and the causes and consequences of the distribution of health, illness, injury, and disease. The health of the world's inhabitants has been impacted by pandemics, environment-caused disease, terrorism, and disasters and nurses are being called upon to care for and improve the lives of affected individuals. This course presents an overview of global health from the viewpoint of nursing and introduces the student to the main concepts of the public health field and the critical links between global health and social and economic development with emphasis on underdeveloped countries. Topics include measures of disease burden; ethics and human rights; environmental health and safety; disparities in the health of women and children; communicable diseases; nutritional challenges; intercultural communication; health and literacy of the marginalized adult; and cultural competency skills.

3 hours of online lecture per week for 7.5 weeks — Prerequisite: NUR 3100

NUR 4410 Community Health (6) — **as required**

This course explores the role of the nurse generalist in a community setting and focuses on prevention of disease and promotion of health in population aggregates. It examines community theory, change theory, epidemiology, and healthcare resources which support disease prevention and health promotion. These healthcare resources provide a basis for public health nursing and the ability to care for, promote, maintain, and restore the health of communities with emphasis on effective community health practice through assessment, program planning, and nursing care for individuals, families, and vulnerable populations. The changing needs of an increasingly culturally diverse population within the social context of community systems are also examined, along with environmental, economic, political, and legal constraints to the health of community systems. Content integrates concepts from nursing and public health sciences. The student conducts an in-depth community assessment employing basic epidemiological principles and data collection strategies. They utilize the nursing process while engaging in health promotion and maintenance strategies in a variety of community health settings and in assessing and planning interventions for high-risk populations and implement a community change project utilizing change theory and based on their assessment of the community.

6 hours of online lecture and preceptorship per week — Prerequisite: MAT 2021; NUR 3110; SOC 1010

Philosophy (PHI)

PHI 1040 Introduction to Ethics (3) **as required**

This course introduces some of the major ethical theories on morally right actions, the morally good person, and the just society. Theories include ethical absolutism, ethical relativism, ethical egoism, utilitarianism, formalism, and rights theory and may relate to contemporary moral issues such as capital punishment, abortion, and euthanasia.

3 hours of lecture per week

Physics (PHY)

PHY 1030 General Physics (4) **fall/spring**

This general physics course introduces the student to basic classical physics. Topics include Newtonian mechanics, elasticity, fluids, heat transfer, and DC circuits.

3 hours of lecture, 3 hours of lab per week Prerequisite: MAT 1210

PHY 1041 Physics I (4) **as required**

This course is a thorough study of the basic principles of physics. Topics include systems of measurement; dynamics, including motion, acceleration, forces producing motion, work, energy, and power; momentum and the conservation laws; statics, including concurrent and non-current forces; and fluids, including properties of gases, fluid pressure, density, buoyancy, and hydraulics. Successful prior completion of a physics course is recommended.

3 hours of lecture, 3 hours of lab per week Corequisite: MAT 1311

[Course fee: $10]

PHY 1042 Physics II (4) **as required**

This course is a continuation of PHY 1041 and emphasizes basic physical concepts that relate both to practical situations and to subsequent technical courses. The fundamental structure of the course provides the student with a firm foundation for understanding semiconductor physics. Topics include thermodynamics; wave motion; electrical and magnetic field theory; light; and solid-state physics.

3 hours of lecture, 3 hours of lab per week Prerequisite: PHY 1041

[Course fee: $10] Corequisite: MAT 1420

PHY 1123 Astronomy (3) **fall/spring**

In this course, the student becomes familiar with the structure and physics of the solar system, the stars, and the universe. It includes a few informal observing sessions with 8- and 10-inch telescopes.

3 hours of lecture per week Prerequisite: MAT 1210

PHY 2041 Fundamentals of Physics with Calculus I (4) **fall/spring**

This course is an alternative for PHY 1041 for the engineering technology student with strong verbal and math skills to apply calculus as its math component. Topics include system of measurement; dynamics, including motion, acceleration, forces producing motion, work, energy, and power; momentum and the conservation laws; statics, including concurrent and non-concurrent forces; and fluids, including properties of gases, fluid pressure, density, buoyancy, and hydraulics. Successful prior completion of a physics course is recommended.

3 hours of lecture, 3 hours of lab per week Corequisite: MAT 1520

PHY 2042 Fundamentals of Physics with Calculus II (4) **fall/spring**

This course is a continuation of PHY 2041 and emphasizes basic physical concepts that relate both to practical situations and to subsequent technical courses. The fundamental structure of the course provides the student with a firm foundation for understanding semiconductor physics. Topics include thermodynamics; wave motion; electrical and magnetic field theory; light; and solid state physics.

3 hours of lecture, 3 hours of lab per week Corequisite: MAT 1520

PHY 3030 Spacecraft Technology (3) **fall/spring**

In this course, the student becomes familiar with space mission technology. Topics include orbit design, mission geometry, launch vehicles, spacecraft design, payloads, ground segment, and operations. The student uses the Satellite Tool Kit software for analysis and design aid.

3 hours of lecture per week Prerequisite: MAT 1210; PHY 1041

PHY 3121 Introduction to Modern Physics (3) **spring**

This calculus-based course continues the study of classical physics and introduces the student to topics in modern physics such as special relativity, atomic theory, solid state physics, nuclear physics, and elementary particle theory.

3 hours of lecture per week Prerequisite: MAT 1520; PHY 1042

Psychology (PSY)

PSY 1010 Introduction to Psychology (3) **fall/spring**

This course introduces the concepts, issues, research, and scientific methods that make up our knowledge of human thought and behavior and provides the basis for further study of psychology as well as a sense of how psychological issues touch on a variety of academic fields and the student's personal life. Topics include research methods, neurophysiology, states of consciousness, learning, memory, theories of personality,

motivation, social psychology, and abnormal behavior.
3 hours of lecture per week

***PSY 1050 Human Growth & Development* (3)** **winter**
This course offers an overview of the human developmental process throughout the life cycle, which includes the social, moral, emotional, cultural, physical, and cognitive aspects of growth. The student is encouraged to explore their own development using the theories of Erikson, Freud, Kohlberg, Piaget, and others integrated into the life-span overview.
3 hours of lecture per week

***PSY 2110 Educational Psychology* (3)** **spring**
This course examines the psychological constructs surrounding instruction and learning in the classroom. Topics include personality theory, motivation, cognition, developmental issues, family systems, class discipline, hope, anger, sexuality, gender, change, collegiality, and parental interaction. Strategies to create healthy relationships are a central focus.
45 hours of lecture per term

***PSY 3070 Abnormal Psychology* (3)** **summer**
This course focuses on the symptoms, causes, and treatments of a wide variety of psychological disorders such as mood, personality, somatoform, dissociative, childhood, eating, and sexual disorders; anxiety; schizophrenia; and organic brain syndromes. It explores historical understanding and treatment of abnormal behavior and diagnostic methods used to classify disorders.
3 hours of lecture per week Prerequisite: PSY 1010

Radiologic Science (RAD)

RAD 1011 Radiologic Clinical Education I (4) **fall**
This course allows the student to acquire clinical experiences and proficiencies sufficient to demonstrate competency in a specified number and variety of diagnostic procedures.
16 hours of clinic per week

RAD 1012 Radiologic Clinical Education II (4) **spring**
This course allows the student to acquire clinical experiences and proficiencies sufficient to demonstrate competency in a specified number and variety of diagnostic procedures.
16 hours of clinic per week Prerequisite: RAD 1011

RAD 1110 Summer Radiologic Clinical Education I (4) **summer**
This course allows the student to acquire clinical experiences and proficiencies sufficient to demonstrate competency in a specified number and variety of diagnostic procedures.
18 hours of clinic per week Prerequisite: RAD 1012

RAD 1111 Summer Radiologic Clinical Education II (4) **summer**
This course allows the student to acquire clinical experiences and proficiencies sufficient to demonstrate competency in a specified number and variety of diagnostic procedures.
18 hours of clinic per week Prerequisite: RAD 1110

RAD 1210 Radiologic Science I (3) **fall**
This course concentrates on the fundamental principles of imaging science including the atom, electromagnetic radiation, x-ray tube components, and x-ray production. Discussion includes the primary factors of technique formation and the art of film critique in clinical application of these principles.
3 hours of lecture per week

RAD 1211 Radiologic Science II (3) **spring**
This course concentrates on the principles that control and contribute to the radiographic image, including density, contrast, and recorded detail. Topics include electricity, magnetism, and x-ray circuitry.
3 hours of lecture per week Prerequisite: RAD 1210

RAD 1310 Radiographic Procedures I (4) **fall**
This is the first of three courses covering radiographic anatomy and positioning. The student uses appropriate medical terminology, performs radiographic exams, and analyzes radiographs critically. Lab positioning begins immediately and includes procedures of the upper and lower extremities, chest, and abdomen. A competency-based curriculum requires the student to prove competency on procedures in the lab prior to performing them in hospital. They must achieve at least 25/28 on a lab competency test for each exam in order to pass.
2.5 hours of lecture, 1.5 hours of lab per week

RAD 1311 Radiographic Procedures II (4) **spring**
This is the second of three courses covering radiographic anatomy and positioning. The student learns standard radiographic positioning and related medical terminology of the bony thorax, pelvic girdle, upper femora, and vertebral column. This course involves lab simulation and evaluation. They must achieve at least 25/28 on a lab competency test for each exam in order to pass the course.
2.5 hours of lecture, 1.5 hours of lab per week Prerequisite: RAD 1310

RAD 2113 Radiologic Clinical Education III (4) **fall**
This course allows the student to acquire clinical experiences and proficiencies sufficient to demonstrate

competency in a specified number and variety of diagnostic procedures.
16 hours of clinic per week — Prerequisite: RAD 1111

RAD 2114 Radiologic Clinical Education IV (4) **spring**
This course allows the student to acquire clinical experiences and proficiencies sufficient to demonstrate competency in a specified number and variety of diagnostic procedures.
16 hours of clinic per week — Prerequisite: RAD 2113

RAD 2210 Radiologic Science Review Seminar (1) **spring**
This course provides an essential review of program topics. It emphasizes and accentuates past learning outcomes to enable the student to pass the American Registry of Radiologic Technologists exam with an in-depth review of the five content categories presented.
1 hour of online seminar per week

RAD 2220 Radiation Biology (3) **spring**
This course explores the principles of radiation biology and radiation protection, including the production of x-rays; the interaction of radiation and matter; radiation units; and methods to protect the radiographer and the patient.
3 hours of online lecture per week

RAD 2230 Radiographic Pathology (3) **fall**
This course provides a survey of the disease process and pathological conditions and presents an in-depth study of diseases commonly demonstrated radiographically.
3 hours of online lecture per week

RAD 2240 Specialized Imaging (2) **spring**
This course concentrates on the principles of fluoroscopy and tomography with an overview of special radiographic procedures and advanced imaging techniques, including computerized tomography and magnetic resonance imaging.
2 hours of online lecture per week

RAD 2312 Radiographic Procedures III (4) **fall**
This is an interactive course that encourages proactive learning by participating in demonstrations and contributing unusual views or techniques from clinical sites. The student expands their knowledge by learning obscure and specialized radiographic views, including views for specific pathologies; upright vs. supine variations of exam; and exams modified to patient condition. The student learns and perfects out-of-the-ordinary or challenging views they have encountered and complete case studies describing clinical situations in which they used critical thinking or performed an exam in an unusual way. The student evaluates all aspects of radiographic images, including the assessment of radiographic contrast and density, recorded detail, and anatomical positioning. Discussion includes image assessment criteria for determining the diagnostic acceptability of diagnostic examinations. Activities focus on student presentations for analysis of selected cases and address improvement alternatives focused on positioning and technique selections.
2.5 hours of hybrid lecture, 1.5 hours of lab per week — Prerequisite: RAD 1311

Respiratory Therapy (RSP)

RSP 1010 Foundations of Respiratory Care (3) **fall**
This course introduces cardiopulmonary anatomy and physiology as the basis for understanding clinical applications of respiratory care, thus encouraging the student to understand the rationale for making clinical decisions that involve patient assessment and therapeutic measures.
3 hours of lecture per week — Corequisite: RSP 1011

RSP 1011 Respiratory Care I (5) **fall**
This course introduces the student to health communication and the legal and ethical issues confronting the respiratory therapist. The student learns to perform the basic assessment skills required to make an objective evaluation of a patient's condition or response to therapy and begins to develop the competence required to deliver specific respiratory care therapeutics to patients.
4 hours of lecture, 3 hours of lab per week
[Course fee: $125] — Corequisite: RSP 1010

RSP 1012 Respiratory Care II (5) **spring**
In this course, the student learns the skills and techniques of managing and treating patients with respiratory needs. It explores the clinical effects of various types of respiratory therapy and diagnostic techniques. Topics include oxygen therapy, aerosol therapy, respiratory drugs, lung expansion therapy, airway clearance therapy, and techniques of airway management.
4 hours of lecture, 3 hours of lab per week — Prerequisite: BIO 2011; RSP 1010, 1011
[Course fee: $125] — Corequisite: RSP 1210, 1601

RSP 1013 Respiratory Care Pharmacology (3) **fall**
This course studies pharmacological principles and practices of respiratory care drugs with emphasis on classification, routes of administration, dosages/calculations, and interaction of the autonomic nervous system. The student explains the mode of action, clinical indications, dosages, hazards, and side effects of adrener-

gics, anticholinergics, xanthines, mucolytics, wetting agents, steroids, antiasthmatic agents, and decongestants; understands the clinical applications of anti-infectives (including vaccines, surfactants, skeletal muscle relaxants, sedative/hypnotics, analgesics, anticoagulants, thrombolytics, specific cardiovascular agents, and diuretics); explain the concept of conscious sedation; understand the general principles of pharmacology; and identify and define abbreviations and symbols used in respiratory care drug therapy.
3 hours of lecture per week — Prerequisite: BIO 2012

RSP 1210 Respiratory Anatomy & Physiology (3) — **spring**
This course teaches the basic physiology of the pulmonary system and details the physiological principles underlying various therapeutics, diagnostic, and monitoring procedures in respiratory care. The student interprets patient data, solves problems, and analyzes patient cases using these physiological concepts.
3 hours of lecture per week — Prerequisite: BIO 2011; RSP 1010, 1011
Corequisite: RSP 1012, 1601

RSP 1601 Respiratory Clinical Field Experience (2) — **spring**
This is a field experience of one day per week that allows the student to become familiar with the hospital setting; perform basic respiratory therapy in acute care areas of the hospital; and get an introduction to evidence-based practice as it applies to respiratory care. Pass/No Pass.
8 hours of clinic per week — Prerequisite: BIO 2011; RSP 1010, 1011
Corequisite: RSP 1012, 1210

RSP 2011 Cardiopulmonary Disease I (4) — **fall**
Analysis of respiratory disturbances requires an understanding of the etiology, pathophysiology, and clinical signs of the disease. The study of cardiopulmonary disease begins with a presentation of advanced clinical assessment techniques. Discussion covers measures used to evaluate oxygenation, ventilation, electrophysiology of the heart, and hemodynamics in relation to respiratory assessment of the critically ill patient.
4 hours of lecture per week — Prerequisite: RSP 2801
Corequisite: RSP 2013, 2602

RSP 2012 Cardiopulmonary Disease II (4) — **spring**
This course is a continuation of RSP 2011 and presents diseases affecting the pulmonary system with emphasis on etiology, pathogenesis, pathology, pathophysiology, and clinical features. It uses a case study approach to enhance the student's ability to exercise judgment in handling patient complaints; collect and examine data; formulate treatment options; assess patient responses to treatment; and modify therapy. It also prepares the student for the NBRC Board Examination.
4 hours of lecture per week — Prerequisite: RSP 2011, 2013, 2602
Corequisite: RSP 2603, 2802

RSP 2013 Respiratory Care III (5) — **fall**
This course gives the student an ordered approach to modern ventilator care, lays out a systematic development of mechanical ventilation competencies concept upon concept, and presents noninvasive and invasive monitoring of the patient on mechanical ventilation. In the classroom, the student applies these concepts to patient care scenarios. In the lab, the student complete a series of mechanical ventilation, intubation, extubation, and critical care monitoring competencies.
4 hours of lecture, 3 hours of lab per week — Prerequisite: RSP 2801
Corequisite: RSP 2011, 2602

RSP 2602 Respiratory Clinical Field Experience II (4) — **fall**
This is a field experience of two days per week that allows the student to work in acute care, critical care, and specialty service areas of the hospital and in the community. The student is directly and indirectly observed performing respiratory care in the assigned clinical settings. They explore non-traditional roles for respiratory therapists, volunteer time in a selected area of practice outside of the traditional hospital practice, and summarize experiences in written and oral reports. They work on a culminating presentation applying evidence-based practice guidelines. Pass/No Pass.
16 hours of clinic per week — Prerequisite: RSP 2801
Corequisite: RSP 2011, 2013

RSP 2603 Respiratory Clinical Field Experience III (6) — **spring**
This course provides a supervised clinical experience in the critical care and specialty service areas of the hospital and the community with a strong emphasis on intensive care techniques and procedures. Instruction takes place in the adult, pediatric, and neonatal areas. The student embarks on infant and pediatric mechanical ventilation and continues to gain proficiency in adult care throughout the medical system. Pass/No Pass.
24 hours of clinic per week — Prerequisite: RSP 2011, 2013, 2602
Corequisite: RSP 2012, 2802

RSP 2801 Respiratory Internship (0) — **summer**
This summer field experience is two days per week and allows the student to practice in clinical areas in which they have received instruction. They are introduced to mechanical ventilators in a lab setting at the hospital and explore non-traditional roles for respiratory therapists, volunteer time in a selected area of practice outside the traditional hospital practice, and summarize experiences in written and oral reports. They begin work on a culminating presentation applying evidence-based practice guidelines. Pass/No Pass.
16 hours of internship per week, 32 volunteer hours prior to graduation — Prerequisite: BIO 2012; RSP 1601

RSP 2802 Respiratory Internship Review (1) **spring**
This course provides the cumulative completion of RSP 2801. Pass/No Pass.
Prerequisite: RSP 2801
[Course fee: $250] Corequisite: RSP 2012, 2603

Sociology (SOC)

***SOC 1010 Introduction to Sociology* (3)** **fall**
This course is a survey of the basic issues, concepts, theories, and methods of sociology. The student learns to think critically about the nature of society and social institutions and the relationship among individuals and groups. Topics include social organization; socialization and social change; social stratification; class and class conflict; gender, race; and ethnicity.
3 hours of lecture per week

Social Science (SSC)

SSC 2030 Energy Systems & Sustainability (3) **fall**
This course covers the historical, societal, economic, and technological factors that drive the development of sustainable energy infrastructure.
3 hours of lecture per week Prerequisite: ENG 1060

SSC 2720 The Social Ecology of Food (3) **fall**
This course examines social, cultural, political, economic, environmental, and ethical issues related to agriculture and food production, distribution, and consumption. It invites the student to consider more mindful approaches to food in their own life, as well as exploring the safety issues that plague food production.
3 hours of lecture per week

SSC 3140 Culture of the Internet (3) **as required**
This course examines the social and cultural structures that have arisen on the internet and as a result of widespread use of the internet among the population at large. Topics include special characteristics of Internet culture and how it relates to the broader culture.
3 hours of lecture per week Prerequisite: ENG 1060

SSC 3660 Class & Educational Success (3) **fall**
This course, framed by the work of Ruby Payne, covers the dynamics of poverty, particularly generational poverty, and the economic class systems in work and school environments. Topics include Lyndon Johnson's "War on Poverty" and the TRiO programs developed by the federal government to address the challenges poverty poses for students attempting to obtain higher education. The student has an opportunity to discuss how these topics relate to their own experience and practice the skills needed to communicate and work with people from a wide variety of backgrounds to be effective in today's workforce.
3 hours of lecture per week Prerequisite: ENG 1060

Veterinary Technology (VET)

VET 1020 Animal Anatomy & Physiology (4) **spring**
This course covers the anatomy and physiology of organs and organ systems in animals with an emphasis on basic physiology common to domestic animals.
3 hours of lecture, 3 hours of lab per week Prerequisite: BIO 2320
[Course fee: $25]

VET 1030 Animal Care & Restraint (3) **fall**
This course teaches the principles of management which are fundamental to animal health and introduces the basics of animal behavior, feeding, housing, and disease prevention. Labs stress hands-on experience with handling, restraint, physical exam, and administration of medications to common domestic species and lab animals. Proficiency in performance of lab tasks is evaluated.
2 hours of lecture, 3 hours of lab per week
[Course fee: $25]

VET 1040 Animal Diseases (4) **spring**
This course explores bacterial, viral, fungal, and parasitic diseases with a review of disease prevention practices. Labs cover diagnostic techniques including microbiology; fungal cultures and evaluations; parasitological specimen collection and processing; necropsy procedures; and specimen handling and shipping.
3 hours of lecture, 2 hours of lab per week Prerequisite: BIO 2320; VET 1030
[Course fee: $25]

VET 1051 Animal Care I (1) **fall**
This course gives the student hands-on experience in the daily care and maintenance of farm, lab, and pet animals. The student is assigned times to care for the colony dogs, cats, rodents, birds, sheep, horses, and dairy animals under supervision. Repeatable for credit.
1 hour of lecture per week, 4 weeks of activity per term
[Course fee: $25]

VET 1052 Animal Care II (1) **spring**

This course gives the student hands-on experience in the daily care and maintenance of farm, lab, exotic, and domestic animals. The student learns requirements for properly documenting all interaction with animals housed in the college facility and works with a partner to encourage teamwork. Repeatable for credit.

1 hour of lecture per week, 4 weeks of activity per term — Prerequisite: VET 1051

[Course fee: $25]

VET 1060 Veterinary Lab Techniques (4) **spring**

In this course, the student learns to perform venipuncture, complete blood counts, urinalysis, serum chemistry, and supplemental hematologic evaluation on all species studied in VET 1030. Emphasis is on proficiency in performing lab tasks.

3 hours of lecture, 3 hours of lab per week — Prerequisite: BIO 2320; VET 1030

[Course fee: $25]

VET 2011 Veterinary Clinical Techniques I (4) **fall**

In this course, the student learns the stages of anesthesia and how to induce and monitor anesthesia under direct supervision of a veterinarian. Surgical nursing skills associated with aseptic technique and proper protocols in the surgery suite are covered as well as pre- and post-op monitoring, record keeping, and client education skills. The student performs blood work, urinalysis, and fecal examination on animals that are scheduled for anesthesia as medically indicated. Some preparatory work and patient monitoring is required outside of scheduled lab time.

3 hours of lecture, 3 hours of lab per week — Prerequisite: VET 1020, 1040, 1060, 2801

[Course fee: $25]

VET 2012 Veterinary Clinical Techniques II (3) **spring**

This course covers radiography of both large and small animals. The labs review anesthesia while the student learns to position animals for radiographs and develop, handle, and store the films. Ancillary techniques such as dentistry procedures are also covered. The student performs blood work, urinalysis, and fecal examination on animals that are scheduled for anesthesia as medically indicated and performs post-anesthesia monitoring. Some preparatory work and patient monitoring is required outside of scheduled lab time.

2 hours of lecture, 3 hours of lab per week — Prerequisite: VET 2011, 2050, 2070

[Course fee: $25]

VET 2030 Animal Nutrition (2) **spring**

This course covers various nutrients and their metabolism and diet formulation for common domestic and lab animals, including species variation in nutritional requirements. Practical information regarding client education for feeding both large and small animals is presented, as is the use of prescription diets for small animals. Nutrition-related diseases are also discussed.

2 hours of lecture per week — Prerequisite: VET 1020

VET 2040 VET Reproduction & Genetics (3) **spring**

This course provides instruction in genetics and comparative reproductive physiology of domestic animals and covers reproductive management, including heat detection; determination of pregnancy; management of pregnant animals and parturition; and reproductive failure. The student assists a veterinarian with reproductive and obstetrical procedures.

3 hours of lecture per week — Prerequisite: VET 2070

VET 2050 Veterinary Applied Lab Methods (4) **fall**

In this course, the student learns medical nursing skills including bandaging, responding to medical emergencies, performing CPR, handling trauma cases, preparing animals for specific diagnostic procedures, obtaining an EKG, completing blood transfusions, and offering fluid therapy. The student also collects and evaluates cytological specimens.

3 hours of lecture, 3 hours of lab per week — Prerequisite: VET 1020, 1040, 1060

[Course fee: $25]

VET 2060 Veterinary Office Procedures (3) **spring**

In this course, the student reviews material on professionalism and interactions with clients that they have been introduced to in other courses before progressing to new information on interpersonal communication, professional correspondence, legal issues regarding medical records, organizing an office, financial record keeping, OSHA compliance, evaluating a potential job position, and getting and keeping a job.

3 hours of lecture per week

VET 2070 Veterinary Pharmacology & Toxicology (3) **fall**

This course reviews dose calculation, dispensing, and administration of medications. The metabolism of commonly used veterinary medications and their beneficial and potential harmful effects on the body are covered. The student becomes familiar with common poisonous substances and plants and assists a veterinarian in treating toxicity cases.

3 hours of lecture per week — Prerequisite: VET 1020, 1040, 1060

VET 2080 Animal Behavior (2) **fall**

This course gives the student a grounding in the natural behaviors of common domestic species including neural, genetic, and endocrine bases for these behaviors. In addition, many aspects of clinical behavioral

medicine are covered, including patient history-taking; reviews of common behavioral problems of dogs and cats; patient evaluation; behavior modification; and drug therapy.
2 hours of lecture per week

VET 2090 Veterinary Technician National Exam Prep Seminar (1) spring
This course is a comprehensive review of the core curriculum material presented in the first three terms of the program to prepare the student for standardized professional examinations such as the Veterinary Technician National Exam.
2 hours of seminar per week Prerequisite: VET 2011, 2030, 2050, 2070

VET 2720 Veterinary Supervisor (1) fall/spring
This supervisory course is required for all veterinary technology students and is repeatable for credit.
1 hour of lecture per week, 4 weeks of activity per term Prerequisite: 2 terms of VET 1051

VET 2802 Summer Externship Review (1) fall
This course is a review of a summer internship experience..
[Course fee: $250]

Special Topics (XXX)

These course numbers are for one-time or special offerings that don't have an approved course number. They may be in any subject area and the credits may vary. The special topics course requirements and evaluation criteria are developed by the instructor, subject to department approval. Details of specific course content are available from the Department Chair for the subject offered.

XXX X610 Special Topics as required

XXX X620 Special Topics as required

XXX X710 Special Topics as required

XXX X720 Special Topics as required

Course names in italics are VSCS shared courses.

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