

West Michigan Aviation Academy Course Selection Handbook



2018-2019

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GRADUATING FROM WEST MICHIGAN AVIATION ACADEMY

1. Graduation from West Michigan Aviation Academy implies that students have satisfactorily completed an approved course of study and that they have acceptably passed any examinations and/or other requirements established by the school.
2. It shall be the responsibility of the CEO and/or his designee to maintain a record system that will adequately provide the information necessary to assure that the above policy is enforced.
3. Only approved courses will be accepted for graduation. Coursework taken anywhere but at West Michigan Aviation Academy must be approved in advance to prevent loss of credit through misunderstanding.
4. Prior credit earned from **accredited** schools is transferable, with these exceptions: doctrinal religion courses; driver's education; service activities such as teacher, office, or library assistant.
5. Students enrolling in summer school for credit must have prior approval from their school counselor.
6. A student may repeat a course that s/he has taken and passed, but it will not be for credit. Although both grades will be recorded, only the higher grade will be used in computing the G.P.A. (grade point average).
7. Students, through approval of their parents, teacher, and counselor, may request to take a course on a credit/no credit basis rather than for a letter grade, but it is limited to one course per semester. It is wise to check with a counselor on the merits of doing so, especially if college admission is a factor.
8. Twenty-six credits, with specific departmental requirements, are needed to receive a diploma from West Michigan Aviation Academy. Students lacking not more than one credit at graduation time will be permitted to participate in commencement exercises, provided they are enrolled in and have paid for summer school for the necessary credit. The diploma will be withheld until all graduation requirements have been fulfilled.
9. Recognizing that a small percentage of students may be unable to meet certain Michigan Merit Curriculum requirements, a Personal Curriculum can be developed. Please see a school counselor regarding this possibility.
10. The Academy's deans and counselors will provide information and assistance to all students to enable them to develop a schedule of courses that will meet requirements for colleges, vocational schools, or any post-high school program selected by the student and her/his parents.
11. The following policies shall govern the graduation requirements of transfer students:
 - A. Any student who attends West Michigan Aviation Academy during the entire senior year will be allowed to graduate from West Michigan Aviation Academy if s/he fulfills the graduation requirements of WMAA.
 - B. Any student who attends West Michigan Aviation Academy for only the last semester of the senior year will be allowed to graduate from West Michigan Aviation Academy if s/he fulfills the graduation requirements of this school, and the school s/he has transferred from refuses to grant a diploma.
 - C. Any student who has attended West Michigan Aviation Academy through the first semester of the senior year and then transfers to another school will be allowed to receive a diploma from West Michigan Aviation Academy and participate in the graduation exercises, if s/he fulfills all of the Academy's graduation requirements. This does not apply to a student who is expelled from West Michigan Aviation Academy.

WMAA GRADUATION REQUIREMENTS

DEPARTMENT	CREDITS	SPECIFIC REQUIREMENTS
English	4.0	
Mathematics	4.0	Through Algebra II; all students must take a math course during senior year
Science	3.0	1.0 credit in physical science 1.0 credit in chemical science, & 1.0 credit in life science
Social Studies	3.0	1.0 credit World History, 1.0 credit U.S. History, .5 credit Government, .5 credit in Economics
World Language	2.0	Two years of the same world language
Physical Education	0.5	
Health	0.5	
Visual, Performing or Applied Arts	1.0	Met through Intro to Engineering & Introduction to Robotics
Electives	8.0	Aviation, engineering, or elective courses
Community Service		100 Hours Required
Junior Testing Requirement		Good faith effort on required State of Michigan assessments
TOTAL	26.0	Minimum Credits Required

SELECTING CLASSES

The West Michigan Aviation Academy Board of Directors has established the following guidelines regarding a student's course load:

1. All students, in all grades, are to be scheduled in seven classes per semester.
2. A college preparatory curriculum consists of a MINIMUM OF FOUR ACADEMIC courses (English, mathematics, social studies, science, world language) each of the four high school years. The more selective the college one has in mind, the more rigorous the academic load should be, both in course difficulty and in number of classes taken.
3. Honors and AP Selection: Each department has developed criteria to help identify who will likely be successful in both honors and AP courses. Using data from each department, students will be placed in and/or encouraged to select the appropriate course during the course registration and scheduling periods.
4. After first semester, teachers and the department chair will identify students who are not meeting and/or exceeding course expectations. Using teacher input and course performance data, students may be moved to a different level course with equivalent content.
5. STEM Endorsement: A student can choose to work toward the STEM endorsement offered at WMAA. The STEM endorsement is in place to inspire and recognize students who have strong interest and performance in science, technology, engineering, and mathematics. The endorsement will serve to set students apart on college and career applications as well as during interviews and scholarship competitions. Students will be recognized for successful completion of the STEM curriculum on their diploma. Classes should be selected in order to fulfill the following:
 - a. Grade of B or higher in all STEM endorsement classes
 - b. 4 credits of mathematics (2 must be AP or Honors)
 - c. 4 credits of science (2 must be AP or Honors)
 - d. 4 additional credits in STEM electives

GRADE LEVEL PLACEMENT

Students at West Michigan Aviation Academy, enrolled in seven classes per semester, have the possibility of earning seven credits per year. To encourage students to make continuing progress toward graduation, credit requirements have been established for grade level placement. The number of credits earned will determine the grade level placement and the grade classification for each student. Guidelines for minimal progress toward graduation are as follows:

For a student to be in 10 th Grade	---	Student must have earned a minimum of	5 credits
For a student to be in 11 th Grade	---	Student must have earned a minimum of	11 credits
For a student to be in 12 th Grade	---	Student must have earned a minimum of	18 credits

Grade level placement will be determined prior to the start of each new school year. Students may not change grade levels during the school year. Students who fail to advance to the next grade level will be affected in terms of:

- Locker assignment
- Yearbook photo designation
- Grade level meetings or assemblies
- Class offices and Student Council

Any student who withdraws from school for any period of time will be enrolled at the appropriate grade level based on earned credits at the time of re-enrollment.

All students new to WMAA will be assigned to a grade level based on credits earned and accepted by WMAA.

Final grade placement will be determined by the school's CEO.

ACADEMIC HONORS

Student honor roll will be identified twice per year, once after first semester grades and again for the spring honors program.

After first semester, students will be identified using semester GPA as follows:

- CEO Honor Roll: 3.8000+
- Dean's Honor Roll: 3.5000-3.7999

For the spring honors programs, academic honors will be defined using cumulative weighted GPA as:

- Cum Laude 3.5000 to 3.7999
- Magna Cum Laude 3.8000 to 3.99999
- Summa Cum Laude 4.0000+

* Grades are provided on a 4.0 scale with weighted grades on a 5.0 scale for all honors and Advanced Placement courses. Cumulative weighted grade point averages are provided on all official transcripts. WMAA does not provide specific class ranking; rather, WMAA uses a quintile ranking system.

STATE MANDATED DUAL ENROLLMENT PROGRAM

Effective April 1, 1996, Public Act 160 and Public Act 258 of 2000, created the Postsecondary Enrollment Options Act, commonly referred to as dual enrollment. This law directs school districts to assist students in paying tuition and fees for courses at Michigan public or private colleges or universities during the academic school year. The following are some of the eligibility guidelines/standards:

1. Students in grades 9 through 12 may take up to ten postsecondary courses during their high school career.
2. The student has earned a Michigan Merit Examination (MME) endorsement in the content area in which he/she intends to dually enroll, if such endorsement is available. The student is eligible to take courses in subjects for which there are no endorsements such as computer science, vocational education, world language courses not offered by the school, and fine arts courses, as permitted by the school.
3. Public Act 594 of 2004, one of the pieces of legislation that created the MME, requires the Michigan Department of Education to set the passing scores on the readiness exams that are used to determine eligibility for dual enrollment. These readiness exams are the MME, the PSAT, the SAT and the ACT. Updated score requirements can be provided by the school counselor or the Michigan Department of Education website.
4. 388.155 Rule 5 (2) The acts do not prohibit a district from supporting any pupil regardless of eligibility under these acts. A district may elect to support college level courses or career preparation courses for any pupil if it is determined to be in the best interest of the pupil.
5. Students must be enrolled in both the eligible school (public or private) and eligible postsecondary institution during the local school's regular academic year and must be enrolled in at least one high school class.
6. The college courses cannot be a hobby, craft, or recreation course, or in the subject areas of physical education, theology, divinity, or religious education.
7. School districts are required to pay an amount equal to the prorated percentage of the statewide pupil-weighted average foundation allowance, based on the proportion of the school year the eligible student attends the eligible postsecondary institution. Eligible charges include tuition and mandatory course fees, material fees, and registration fees required by an eligible institution for enrollment in the course. *Eligible charges do not include transportation or parking fees or activity fees.*

* Students who dual enroll with West Michigan Aviation Academy must sign a Dual Enrollment Agreement with their school counselor prior to the first day of the dual enrollment course.

TESTING OUT POLICY

West Michigan Aviation Academy, in compliance with the School Code of Michigan, will allow students to “test out” of any course or credit area. These tests will be a sound demonstration that a student meets or exceeds the content expectations associated with the credit area. Because some end-of-year tests do not serve as comprehensive measures of content and skill “mastery” as expressed in the Michigan School Code, students may be required to demonstrate a reasonable degree of mastery either through a written examination, written papers, projects, portfolios, or other comparable forms.

The following statements will apply to the testing out provision:

1. This policy will apply equally to all students at West Michigan Aviation Academy.
2. Course advancement, credit and/or waiver will only be granted for a C+ (77%) or better. If there is no final exam, credit will be earned by exhibiting mastery through the basic assessment used in the course and may consist of a portfolio, performance paper, project, and/or presentation.
3. When testing out of high school courses, this testing out provision will count toward graduation requirement credit. Successful completion of the testing out provision will also count toward fulfillment of a requirement for a subject area or a course sequence.
4. Once credit is earned by testing out, a student may not receive credit thereafter for a course lower in course sequence concerning the same subject area.
5. Credits earned through testing out will not be included in a computation of grade point average.
6. The Academy will establish reasonable times when testing out is available.

TIMELINE FOR TESTING OUT OPTION

March 2018	The school will make testing out information available.
April 27, 2018	A completed application form indicating the course(s) a student wishes to test out of must be submitted to the school office.
June 14, 2018	Students may obtain a course syllabus and a description of what will serve as exhibition of mastery of course outcomes. Texts and related materials will be made available in the office.
August 13, 2018	Assessments for all courses will be administered at 9am.
August 2018	Notification of testing results will be provided to the student during returning student registration day.

ONLINE COURSES

West Michigan Aviation Academy strongly believes that face-to-face classroom instruction at the high school is the best learning environment for students. If the opportunity exists for students to enroll in a face-to-face course offered at the high school, the student is strongly encouraged to do so. However, we recognize that there are situations when a student's best learning option is to enroll in an online/virtual course.

To be successful in an online class, a student must be a self-starter with a strong sense of direction and the ability to set goals and follow through. A successful online student will work independently, stay on task, and maintain a regular schedule of logging on and keeping up with readings, course assignments, homework and other expectations. An online class is different, not necessarily easier or harder, and the added factor of self-motivation and self-discipline may cause additional challenges for a student.

While a WMAA teacher monitors online course progress, the student will have communication with a virtual teacher who is assigned to the course. The virtual teacher is the one who grades assignments and determines the final grade for the course. Students wishing to enroll in a virtual course must meet with his/her counselor to begin the application process and select from an approved list of online courses. Students and parents will also be required to sign the *Online Learning Agreement* prior to the student gaining access to the online course.

VIRTUAL OPTION #1

WMAA provides online/virtual classes to meet the needs of students in the following situations:

- The student's daily schedule prevents him/her from enrolling in a specific academic or elective course offered by WMAA,
- The student needs to fulfill a graduation requirement not offered at WMAA,
- The student needs to enroll in a course for credit recovery and it is not available during the school day, i.e. to make up credit for a course s/he previously failed,
- The student's schedule is incomplete and s/he needs an additional course,
- The student has a prolonged illness and is unable to attend school for an extended period of time.

VIRTUAL OPTION #2 - SECTION 21F OF THE STATE SCHOOL AID ACT OF 2013

In Section 21f of the Michigan School Code, students or parents may request to enroll in online courses. A student may not enroll in an online course if (1) the course is not offered for credit, (2) the student previously gained credit in the course, (3) the course is inconsistent with the student's graduation requirements or post-secondary plans, (4) the student does not possess the prerequisite knowledge and skills to be successful in the course, (5) the student demonstrated failure in previous online coursework, (6) the course is of insufficient quality or rigor, as determined by the academy.

WEST MICHIGAN AVIATION ACADEMY COURSE DESCRIPTIONS

AVIATION DEPARTMENT

Course Title	Credit	Grade Offered
Introduction to Aviation	0.5	9
Aviation History and Literature	0.5	9
Flight Brief	0.25	10
Aviation Physiology	0.25	10
Introduction to Aviation Weather	0.25	10
Introduction to Aviation Flight Planning	0.25	10
Introduction to Aviation Maintenance	0.25	10
Introduction to Remote Control Aircraft	0.25	10
Private Pilot Ground School	1.0	11
Aviation Business Administration	0.5	11, 12
KCTC Aviation Maintenance Technology	3.0	11, 12
KCTC Aviation Electronics	3.0	11, 12
Introduction to Unmanned Aerial Systems	0.5	11, 12
Advanced Aviation	0.5	12
Instrument Flight	0.5	12
Private Pilot Flight School	2.0	12

INTRODUCTION TO AVIATION

Prerequisite: None

Credit: 0.5

Grade Level: 9 *Required for all 9th grade students

This *Introduction to Aviation* course is designed to expose students to the exciting field of aviation and provide a solid foundation of knowledge, skill, and strategies that will be refined, applied, and extended in future aviation courses. In *Introduction to Aviation*, students will explore the basics of aeronautics and aerodynamics, fundamentals of flight, rockets and space, navigation, basic weather principles and the exploration of the aerospace community. West Michigan Aviation Academy freshman will use this course to begin to define and expand their individual interest in one of four core areas of study: Aircraft Maintenance Technology, Engineering, Aviation Administration, or Aviation Flight Science. The course will also be used to ignite and kindle a life-long passion for aviation.

AVIATION HISTORY AND LITERATURE

Prerequisite: None
Credit: 0.5
Grade Level: 9 *Required for all 9th grade students

This *Aviation History and Literature* course is designed to expose students to the rich history of aviation while reinforcing and building the necessary reading, writing, and presentation skills needed to succeed in the field of aviation and beyond. This course will examine the early discovery and invention of flying machines while providing a sequential historical foundation of significant aviation-related milestones. Students will be expected to complete a biography and presentation highlighting the achievements and struggles of a famous aviation iconic figure. Students will also be required to correctly identify significant aviation iconic figures and their contribution to the aviation community, as well as correctly identify specific civilian and military aircraft. Finally, students in the *Aviation History and Literature* course will read several non-fiction and fictional aviation-related selections. This course will culminate with a student written "I" research paper.

FLIGHT BRIEF

Prerequisite: None
Credit: 0.25
Grade Level: 10 *required for all 10th grade students

The purpose of WMAA's *Flight Brief* course is to develop and improve students' ability to speak publically in a range of settings. Students will be exposed to the variety of public speaking opportunities within the field of aviation and beyond. Emphasis will be placed on listening skills, organization and support, and dynamic delivery. The course goals include improving control over speaking habits and enunciation and addressing all situations with poise and confidence. *Flight Brief* students will be expected to participate in formal and informal speaking opportunities as well as delivering formal addresses.

AVIATION PHYSIOLOGY

Prerequisite: None
Credit: 0.25
Grade: 10

The *Aviation Physiology* course is a physical education course in which students will be introduced to aviation physiology concepts and overall aviation-related fitness. Aspects of aviation physiology will include vision for flight, vestibular disorientation, hypoxia and hyperventilation, effects of pressure on ear and sinus blockage, motion sickness, stress, fatigue, as well as the impact of alcohol and other drug use. Additionally, aviation medical certificate requirements will be outlined to ensure students are aware of industry standards. Pilot personal fitness activities will include body composition, muscular strength and endurance, as well as cardiovascular endurance. *Aviation Physiology* students will be continuously educated on proper stretching, nutrition, and lifting techniques to develop an overall healthy lifestyle.

INTRODUCTION TO AVIATION WEATHER

Prerequisite: None

Credit: 0.25

Grade Level: 10 *suggested for sophomores pursuing the flight program

This class is designed to give students an overview of the composition of the atmosphere and how it relates to the weather found on Earth. The following topics will be analyzed: the heating of the Earth's surface and atmosphere, moisture and atmospheric stability, forms of condensation and precipitation, air pressure and winds, circulation of the atmosphere, air masses, weather patterns, thunderstorms and tornadoes, hurricanes, and an introduction to weather forecasting and analysis. For many of these topics, a study of how the field of aviation is affected by different aspects of weather will be applied.

INTRODUCTION TO AVIATION FLIGHT PLANNING

Prerequisite: None

Credit: 0.25

Grade Level: 10 *required for sophomores pursuing the flight program

This *Introduction to Aviation Flight Planning* course is designed to expose students to the necessary math-related skills required for aviation flight science. *Introduction to Aviation Flight Planning* will make full use of aviation maps, charts, graphs, and flight planning tools. Basic algebra concepts will be utilized to complete flight-planning requirements associated with time, distance, speed, and fuel calculations. Additionally, the component of wind will be introduced as it relates to wind triangle calculations for flight planning and flight execution for calculating crosswind-landing requirements. Students will also be required to utilize the appropriate aviation-related charts and graphs to complete altitude conversions, aircraft weight and balance calculations, as well as takeoff and landing calculations. Finally, simple aviation map interpretation and airspace structure should be expected. The principles introduced in *Introduction to Aviation Flight Planning* will be extended and expanded upon for those students continuing in aviation flight science and engineering pathways. The course will also be used as a prerequisite requirement for *Private Pilot Ground School*.

INTRODUCTION TO AVIATION MAINTENANCE

Prerequisite: None

Credit: 0.25

Grade: 10

The *Introduction to Aviation Maintenance* course will introduce interested sophomore students to various aspects of aviation maintenance technology. The course will include field trips to such places as Landmark Aviation, Kent Aviation Center, and the School of Missionary Aviation and Technology (SMAT) at the Ionia Airport. Establishing an environment of aviation safety is paramount for this aviation elective. Students will be held to strict rules and procedures to ensure personal safety at all times – SAFETY FIRST! Topics will include the basics of aircraft maintenance that include: utilizing hand and measuring tools, electrical components, reciprocating engine theory, aircraft hardware, aircraft inspections, preventive maintenance, metal structure repair, wood structure repair, and composite repair. Students can expect a hands-on experience and will be required to participate in all activities.

INTRODUCTION TO REMOTE CONTROL AIRCRAFT

Prerequisite: None
Credit: 0.25
Grade Level: 10

This *Introduction to Remote Control Aircraft* course is designed to expose students to the basic flying and construction requirements to become proficient at both flying and building R/C aircraft. The use of Real Flight R/C Simulation will be a centerpiece of this class to provide students with the foundational skills necessary to become safe and confident R/C pilots. As students strive to become proficient at flying, they can expect a hands-on environment in which they will work within small groups to construct small-scale indoor electric R/C aircraft. Finally, students will learn about the basic electronics required for operation to include the programming of transmitters and receivers for proper servo functionality. For students with an interest in the Unmanned Aerial Systems (UAS) industry, this class is a must!

PRIVATE PILOT GROUND SCHOOL

Prerequisite: Algebra I (B or higher), Introduction to Aviation Flight Planning
Credit: 1.0
Grade: 11

The *Private Pilot Ground (PPG) School* course is designed to prepare students for successful completion of the Federal Aviation Administration (FAA) private pilot written examination. Additionally, this course will provide the necessary foundation for students to successfully begin formal flight training. In PPG, students will examine aviation topics such as: principles of flight, aircraft systems, airplane performance, flight operations, radio communication, FAA regulations, human factors associated with aviation, aviation weather, navigational charts and calculations, and cross country flying. Additionally, the integration of desktop flight simulation will allow hands-on opportunities to explore classroom concepts as well as exposure to basic flight maneuvers. Upon successful completion of this course, students will receive a Certified Flight Instructor (CFI) logbook endorsement to take the FAA private pilot written examination. Successful completion will require a final examination grade of 80% or higher.

AVIATION BUSINESS ADMINISTRATION

Prerequisite: Introduction to Aviation
Credit: 0.5
Grade: 11, 12

The *Aviation Business Administration* course will introduce students to the broad scope of the business aspects of the aviation industry. Students will receive firsthand knowledge and insight through the eyes of aviation industry experts located at Gerald R. Ford International Airport and beyond. Topics will examine such areas as: aviation safety; airport environment and management; airline management; airport planning, construction, and security; and aviation law. Small group projects and classroom activities will allow students to explore many business aspects of aviation to include individual and corporate leadership styles, marketing styles and strategies, and business management.

KCTC AVIATION MAINTENANCE TECHNOLOGY

Prerequisite: None
Credit: 3.0 (elective)
Grade: 11, 12

Offered through the KENT ISD, this one- or two-year program targets students interested in careers in aviation maintenance, professional piloting, air traffic control, or aeronautical engineering. It introduces students to the knowledge and skills required in the field of aviation maintenance technology, while also highlighting skills required for a variety of airport related career opportunities. Students enrolled in this program attend classes off-site at Kent Aviation Center. Students start and taxi single engine aircraft. They learn how to start and operate an Allison 250 turbine engine. They disassemble, inspect, reassemble and operational-check aircraft components. The learning environment reflects a real workplace similar to the one students will encounter during a career in aviation maintenance, including working on several operational aircraft in KAC's 20,000 square foot hangar.

KCTC AVIATION ELECTRONICS

Prerequisite: None
Credit: 3.0 (elective)
Grade: 11, 12

Offered through the KENT ISD, this program is for students interested in electricity, electronics, avionics, aircraft maintenance, engineering, and flight sciences. The course is offered at the KAC hangar at the Gerald R. Ford International Airport. Students enrolled in this program learn electrical theory, basic troubleshooting, systems repair, and install equipment in real aircraft. The learning environment reflects a real workplace; students might encounter during a career in avionics including electrical and electronic systems repair and troubleshooting. Upon course completion students should be prepared to take the NCATT AET (Aircraft Electronics Technician) exam, which grants national certification as an AET.

INTRODUCTION TO UNMANNED AERIAL SYSTEMS

Prerequisite: Intro to Remote Control Aircraft
Credit: 0.5
Grade Level: 11, 12

This *Introduction to Unmanned Aerial Systems* course is designed to engage hands-on learners to explore operations associated with Unmanned Aerial Systems (UAS). The UAS Industry is on the verge of rapid growth and innovation as the Federal Aviation Administration (FAA) provides the necessary regulatory oversight for these systems. Students who participate in the class can expect to obtain the necessary foundation to explore real-world opportunities associated with UAS. Additionally, an inquiry-based learning environment will engage students to challenge and explore their personal creativity and intrigue within this domain. Students will be expected to participate in performance-based assessments demonstrating their individual and small group UAS skills. Only students who possess basic R/C flying skills should consider this class.

ADVANCED AVIATION

Prerequisite: Private Pilot Ground School
Credit: 0.5
Grade: 12

The *Advanced Aviation* course is designed to expose students to multiple topics that are fundamental to real world flight operations and other components related to the aviation industry. This course will include such topics as: NextGen Air Traffic Control, aviation safety; human factors in aviation; Crew Resource Management (CRM) techniques; Operational Risk Management (ORM) concepts; and the Aeronautical Decision-Making Process. Additionally, the *Advanced Aviation* course will provide an overview of airport planning and management practices and will also assist students to investigate post-secondary opportunities within the aviation industry.

INSTRUMENT FLIGHT

Prerequisite: Private Pilot Ground School
Credit: 0.5
Grade: 12

The *Instrument Flight* course is designed to introduce students to the challenging concepts associated with flying without visual reference during instrument flight conditions. Students will examine the following topics in this course: aviation weather, national airspace system, air traffic control system, flight instruments, navigation systems, instrument flight planning and flight procedures, and instrument approach procedures. Additionally, the integration of desktop flight simulation will allow hands-on opportunities to explore classroom concepts as well as exposure to simulated instrument flight scenarios. Students will also utilize web-based aviation-related resources to plan and produce real-world instrument flight plans.

PRIVATE PILOT FLIGHT SCHOOL

Prerequisites: Private Pilot Ground School
Passed FAA Private Pilot Written Exam
Passed FAA 3rd Class Medical Examination
Administrator Recommendation
Signed Parent Consent
Credit: 2.0
Grade Level: 12

The *Private Pilot Flight School* course is considered the capstone course for those students who have the desire and motivation to become FAA Certified Private Pilots. Students in this class can expect to utilize the WMAA Redbird simulator, advanced aviation simulation lab, and our Cessna 172s to complete the required FAA flight training requirements to become a private pilot. Additionally, this class will make full use of the Jeppesen Flight Training Syllabus and follow strict adherence to FAA performance standards to ensure student safety and success. The culmination of this class will be successful completion of the Private Pilot Practical Examination administered by an FAA Designated Flight Examiner.

Course Title	Credit	Grade Offered
Introduction to Engineering Principles	0.5	10
Introduction to Robotic Systems	0.5	10
Aerospace Design & Simulation	0.25	10
Drafting	0.25	10
Engineering Ethics	0.5	11, 12
Digital Engineering	0.5	11, 12
Biomedical Engineering I	0.5	11, 12
Biomedical Engineering II	0.5	11, 12
Introduction to Computer Science	0.5	11, 12
Computer-Aided Design and Drafting	0.5	11, 12
Aerospace Engineering	1.0	11, 12
Advanced Robotics	1.0	11, 12
Autonomous Vehicle Systems	1.0	11, 12
AP Computer Science A	1.0	11, 12
AP Computer Science Principles	1.0	11, 12
Engineering Design and Development	1.0	12

INTRODUCTION TO ENGINEERING PRINCIPLES

Prerequisite: None

Credit: 0.5

Grade Level: 10 *Required for all 10th grade students

This introductory lab and project-based course integrates science, technology, engineering, and mathematics (STEM) concepts and exposes students to fundamental theories of engineering with an aviation focus. Students work in collaborative teams while developing skills in the areas of career exploration, electricity and electronics, drive mechanisms, mechanical design, and basic circuit board construction. Teamwork and time management are also key components of this course. This course will count towards the Michigan Merit Curriculum Applied Arts requirement.

INTRODUCTION TO ROBOTICS SYSTEMS

Prerequisite: None
Credit: 0.5
Grade Level: 10 *Required for all 10th grade students

This introductory lab and project-based course integrates science, technology, engineering, and mathematics (STEM) concepts and exposes students to fundamental theories of programming and robotics, with an aviation focus. Students typically work in collaborative teams while developing skills in the areas of sensors, programming logic controllers and robots, and basic robot construction. Teamwork and time management are also key components of this course. This course will count towards the Michigan Merit Curriculum Applied Arts requirement.

AEROSPACE DESIGN & SIMULATION

Prerequisite: None
Credit: 0.25
Grade: 10

The *Aerospace Design & Simulation* course will be an adventure in the investigation, construction and flying of aircraft. Students considering aerospace engineering or the Private Pilot Flight School will enjoy the hands-on activities associated with this class. This course will incorporate aspects of aeronautical engineering and design while working in small student groups. Activities include multiple experiments flying various aircraft in X-Plane flight simulators to discover how aircraft fly and how an aircraft's design affects its stability and performance. Additionally, students will use balsa wood aircraft in small group experiments to expand upon the knowledge learned in the simulators. The class culminates with the design and construction of a custom balsa wood glider.

DRAFTING

Prerequisite: None
Credit: 0.25
Grade: 10

This course will allow sophomore students to gain a brief preview of and some experience with paper and pencil drafting. Students will learn about different types of views, how to draw things to scale, and how to represent their ideas in an organized and unambiguous manner on paper.

ENGINEERING ETHICS

Prerequisite: None
Credit: 0.5
Grade: 11, 12

This course introduces the theory and practice of engineering ethics by looking at the theory of ethics, discussing case studies in engineering, and writing a detailed group research report. The theory of ethics and philosophy will be taught using the classics of Aristotle, Kant, Kierkegaard and Augustine. The case study section of the course will focus on past engineering feats and how ethical considerations played into that work. Students will also propose hypothetical cases and spend time discussing and analyzing them. The third section of the class involves students working in teams and selecting a case study to analyze and write a paper about.

DIGITAL ENGINEERING

Prerequisite: None
Credit: 0.5
Grade Level: 11, 12

Digital Engineering is about understanding digital circuitry, logic, and how digital signals control almost every electronic device that we see today. Students will work with simple circuits to build an understanding of Boolean algebra, binary, and logic gates. As the class progresses, the circuits become more complex which allows students to understand current issues found within digital circuits.

BIOMEDICAL ENGINEERING I

Prerequisite: None
Credit: 0.5
Grade Level: 11, 12

Students will investigate the roles of biomedical professionals as they identify problems and strategize to design solutions to a variety of health challenges in the context of real-world, human-centered cases via design thinking. Students will be asked to identify perceived needs, brainstorm solutions, and creatively think to develop prototypes using simple materials. Throughout the semester, students will advance their understanding of “empathy” as being at the center of biomedical engineering problems as they take a hands-on approach to engineering human-centered solutions while exploring topics like: introduction to biomedical engineering, design thinking in biomedical engineering, biomechanics, and bioelectronics.

BIOMEDICAL ENGINEERING II

Prerequisite: None
Credit: 0.5
Grade Level: 11, 12

Students will investigate the roles of biomedical professionals as they identify problems and strategize to design solutions to a variety of health challenges in the context of real-world, human-centered cases via design thinking. Students will be asked to identify perceived needs, brainstorm solutions, and creatively think to develop prototypes using simple materials. Throughout the semester, students will advance their understanding of “empathy” as being at the center of biomedical engineering problems as they take a hands-on approach to engineering human-centered solutions while exploring topics like: biomaterials, bioinstrumentation, biotechnology, and biorobotics.

AEROSPACE ENGINEERING

Prerequisite: Aerospace Design and Simulation
Credit: 1.0
Grade: 11, 12

Aerospace Engineering explores the evolution of flight, navigation and control, flight fundamentals, aerospace materials, propulsion, space travel, and orbital mechanics. In addition, this course presents alternative applications for aerospace engineering concepts. Students analyze, design, and build aerospace systems. Through hands-on projects, students apply engineering standards and document their work. Students use industry-standard 3D modeling software to help them design solutions to solve proposed problems, document their work using an engineer’s notebook, and communicate solutions to peers and members of the professional community.

INTRODUCTION TO COMPUTER SCIENCE

Prerequisite: Algebra 1
Credit: 0.5
Grade: 11, 12

This course introduces students to computer science concepts that will help them gain a broader understanding of computer architecture, the use of computer code, networks, and the Internet. Students will utilize project-based programming and data manipulation to produce finished software programs. They will use the design process to create a variety of programs by determining specifications, designing the software, and testing and improving the product until it meets the specifications. By the end of this course, students will have a solid foundation for further study in computer science that will lead to specific certifications.

COMPUTER AIDED DESIGN AND DRAFTING (CADD)

Prerequisite: None
Credit: 0.5
Grade: 11, 12

This course provides an introduction to computer-aided design and drafting (CADD). Students will be exposed to the basics of mechanical drawing and drafting, then transition to CADD using the SolidWorks software. The course will culminate with a computer-designed product that will be produced with a 3D printer (modeling). Learning 3D design is an interactive process; The students will spend the majority of their class time exploring SolidWorks and expanding their design abilities.

ADVANCED ROBOTICS

Prerequisite: None
Credit: 1.0
Grade: 11, 12

This course expands on the knowledge of different robotic systems introduced in the introductory robotics courses. This course will focus on tinkering and prototyping to design, build, and program robots that are competition-ready. An intended outcome of this course is student participation in after school robotics competitions.

AUTONOMOUS VEHICLE SYSTEMS

Prerequisite: Computer Science, AP Computer Science, or AP Computer Science Principles
Credit: 1.0
Grade: 11, 12

This capstone course focuses on the systems and processes necessary to design, build, and program fully autonomous vehicles. The end goal of this course is for students to be successful in building and programming fully autonomous drones capable of performing complex tasks without direct human control.

ADVANCED PLACEMENT (AP) COMPUTER SCIENCE PRINCIPLES

Prerequisite: Algebra I
Credit: 1.0
Grade: 11, 12

AP Computer Science Principles introduces students to the fundamental concepts of computer science and challenges them to explore how computing and technology can impact the world. With a unique focus on creative problem solving and real-world applications, AP Computer Science Principles prepares students for college and career. This class offers a multidisciplinary approach to teaching the underlying principles of computation. Students will be exposed to the creative aspects of programming, abstractions, algorithms, large data sets, the Internet, cyber-security concerns, and the impact of computers. AP Computer Science Principles will give students the opportunity to use technology to address real-world problems and build relevant solutions.

ADVANCED PLACEMENT (AP) COMPUTER SCIENCE A

Prerequisite: Introduction to Computer Science, AP Computer Science Principles, or Algebra 2
Credit: 1.0
Grade: 11, 12

This *AP Computer Science A* course prepares students to take the College Board's AP Computer Science A exam. This challenging class is for junior- and senior-level students who are interested in an in-depth course in computer science theory and practice. Students will learn to program in the Java language, with an emphasis on problem solving, computer science theory, applications, algorithms, programming style, and programming design.

ENGINEERING DESIGN AND DEVELOPMENT (EDD)

Prerequisite: Aerospace Engineering
Credit: 1.0
Grade: 12

Implementing the engineering design process, this course allows students work in teams to design and develop an original solution to an open-ended technical problem. After carefully defining the problem, teams spend the duration of the course designing, building, and testing their solution(s) under the guidance of industry professionals. At the conclusion of the course, students are expected to present and defend their original solution to a panel of industry professionals.

Course Title	Credit	Grade Offered
Literacy Lab	1.0	9
English 9	1.0	9
English 9 Honors	1.0	9
Flight Brief	0.25	10
English 10	1.0	10
English 10 Honors	1.0	10
English 11	1.0	11
English 11 Honors	1.0	11
Yearbook	1.0	11, 12
Creative Writing	0.5	11, 12
English 12	1.0	12
AP English Literature and Composition	1.0	12

LITERACY LAB

Prerequisite: Placement by Student Services and English Department

Credit: 1.0

Grade: 9

The goal for *Literacy Lab* is to provide additional support and intervention to students enrolled in *English 9* who have been identified as learners who will benefit from extended English content instruction. This course will provide students with supplemental practice and instruction as they build their foundation of knowledge and strengthen their reading comprehension, writing fluency, and grammatical competence that will be essential to their success in upperclassmen English coursework. Specifically, students in *Literacy Lab* will review basic elements of grammar and writing organization, expand vocabulary repertoires, study reading comprehension strategies, and practice close-reading text analysis. Depending on the department recommendation, *Literacy Lab* may be taken as semester or yearlong course: students may graduate out after semester one if they show adequate improvement as determined by teacher, counselor, and parent/student. This course will count toward an elective credit.

ENGLISH 9

Prerequisite: None
Credit: 1.0
Grade: 9

The goal for *English 9* is to build a solid foundation of knowledge, skills, and strategies that will be refined, applied, and extended as students engage in more complex ideas, texts, and tasks. In *English 9*, students will be introduced to the various genres of classic and contemporary narrative and informational texts that will be read and analyzed throughout high school. Key themes emphasized throughout *English 9* are: "A Dream Deferred", "The Universality of the Human Experience", and "Self-Determination". Students will consider how they build relationships, how their relationships impact others, and their responsibility to society. Additionally, students will demonstrate mastery of literature, writing, language (vocabulary and grammar), and speaking and listening skills through small and large group discussion, individual and small group projects, written analysis, and quizzes and tests.

ENGLISH 9 HONORS

Prerequisite: Middle school or Department Recommendation
Credit: 1.0
Grade: 9

The goal for *English 9 Honors* is to extend beyond the basic knowledge, skills, and strategies to engage in more complex ideas, texts, and tasks. In *English 9 Honors*, students will be challenged to various genres of classic and contemporary narrative and informational texts that will be read and analyzed throughout high school. Key themes emphasized throughout *English 9 Honors* are: "A Dream Deferred", "The Universality of the Human Experience", and "Self-Determination". Students will consider how they build relationships, how their relationships impact others, and their responsibility to society. Additionally, students will demonstrate mastery of literature, writing, language (vocabulary and grammar), and speaking and listening skills through small and large group discussion, individual and small group projects, written analysis, and quizzes and tests. The complexity of texts and the pace of *English 9 Honors* are both more challenging than the traditional sections of *English 9*.

ENGLISH 10

Prerequisite: English 9
Credit: 1.0
Grade: 10

The goal for *English 10, American Literature*, is to further students' literacy skills, knowledge, and strategies as they apply to the reading and writing of literature, particularly as it relates to their world. In *English 10*, students will delve into the various genres of classic and contemporary American narrative and informational texts through reading and analysis. Tenth graders will connect with and respond to texts by analyzing relationships between cultures, ethnicities, regions, economies, and time periods. By engaging with texts written by a diverse set of authors, students will learn to relate their lives and experiences to those of other people and groups. Students will also learn to question their role in and responsibility to society.

ENGLISH 10 HONORS

Prerequisite: Department Recommendation
Credit: 1.0
Grade: 10

The goal for *English 10 Honors* is to further students' literacy skills, knowledge, and strategies as they apply to the reading and writing of literature, particularly as it relates to their world. In *English 10*, students will delve into the various genres of classic and contemporary American narrative and informational texts through reading and analysis. Tenth graders will connect with and respond to texts by analyzing relationships between cultures, ethnicities, regions, economies, and time periods. By engaging with texts written by a diverse set of authors, students will learn to relate their lives and experiences to those of other people and groups. Students will also learn to question their role in and responsibility to society. The complexity of texts and the pace of *English 10 Honors* are both more challenging than the traditional sections of *English 10*.

FLIGHT BRIEF

Prerequisite: None
Credit: 0.25
Grade Level: 10 *required for all 10th grade students

The purpose of WMAA's *Flight Brief* course is to develop and improve students' ability to speak publicly in a range of settings. Students will be exposed to a variety of public speaking opportunities within the field of aviation and beyond. Emphasis will be placed on listening skills, organization and support of speech writing, and dynamic delivery. The course goals include improving control over speaking habits and enunciation and addressing all situations with poise and confidence. *Flight Brief* students will be expected to participate in formal and informal speaking opportunities as well as delivering a panel discussion group presentation.

ENGLISH 11

Prerequisite: English 10
Credit: 1.0
Grade: 11

English 11 is designed to give students a taste of the English literary canon while developing an appreciation for the evolution of the English language. *English 11* is a comprehensive survey of British authors and the chronological development of British literature. Through reading, writing, speaking, listening, and viewing experiences, students explore works from *Beowulf* through the Modern Age. The course will cover the development and importance of storytelling in society. Students will develop critical thinking skills through literary analysis and open dialogue. The course encourages literary analysis through a variety of writing modes in preparation for the Michigan Merit Exam. Students will also prepare for the reading, writing, and English portions of the SAT. Required reading will include essays and other non-fiction texts, plays, novels, short stories, and poems.

ENGLISH 11 HONORS

Prerequisite: Department Recommendation
Credit: 1.0
Grade: 11

The *English 11 Honors* course offers pre-AP English students an opportunity for a rigorous survey of British authors and the chronological development of British literature. Through extensive reading, writing, speaking, listening, and viewing experiences, students explore works from Beowulf through the Modern Age. The course encourages in-depth literary analysis with an increased sophistication in analytic and argumentative writing and research. Students will create a variety of presentations using technology. Required reading will include essays and other non-fiction texts, novels, short stories, and poems.

YEARBOOK

Prerequisites: Successful completion of English 10; Application Required
Credit: 1.0
Grade: 11, 12

Yearbook is businesslike in nature and allows students to participate in the production of the school yearbook and multiple school news outlets. Students in this course are required to learn layout design; write and fit copy, captions, and headlines; sell advertisements; learn basic photography skills; and be proficient on a computer. Individual responsibility is essential toward completion of assignments for deadlines. Students will also have the opportunity to accept leadership positions and develop new skills as they build the yearbook. Students will also have an opportunity to participate in multiple committees including copy editing, senior photo and quote collecting, WMAA News broadcasting, social media advertising, administrative inventory and invoicing, and layout design. To register for this course, students must sign up for both first and second semesters and have completed English 10 successfully. Interested students must complete and submit an application. This course will count toward an elective credit.

CREATIVE WRITING

Prerequisite: None
Credit: 0.5
Grade: 11, 12

This semester long elective will allow students to explore and refine their creative writing skills in a variety of different mediums. We will write short stories, poetry, memoirs, micro-fiction, and many other types of creative, written expression. We will also explore the editorial and publishing process in more depth than a general English class. Student work will culminate in a portfolio of polished work completed by the end of the semester. This elective would be ideal for a student who wants a creative outlet during the day or who is interested in a career in journalism, writing, or publishing. This course will count toward an elective credit.

ENGLISH 12

Prerequisite: English 11
Credit: 1.0
Grade: 12

English 12 is a course in which students prepare for the reading and writing lives they will lead after high school. Three essential components exist: the choice reading program, professional writing, and world literature. In the first semester, we launch the choice reading program, which continues throughout the entire year. We then layer in a focus on the methodology of writing within the realms of post-secondary preparation. Towards the end of first semester, we will begin incorporating whole-class texts, studying multimodal literature (in the form of a podcast), the formation of one's identity, and journeys. This evolves into second semester's study of world literature. Important concepts from our whole-class texts include discernment, cultural understanding, and empathy with regard to all forms of literature in a global context. Students will seek to understand the moral and artistic value of various cultures through the works studied. Together we will learn and think about the world's literatures and discuss other worldviews with an open mind.

ADVANCED PLACEMENT (AP) ENGLISH LITERATURE AND COMPOSITION

Prerequisite: Department Recommendation
Credit: 1.0
Grade: 12

AP English Literature and Composition is a two-semester, college-level course designed to foster deeper growth in the careful reading and critical analysis of works of literary merit. The course involves extensive study of how to form meaning and produce college-level writing about these texts. Each student is expected to take the AP English Literature and Composition Exam that is administered in May. Successful achievement on the AP Exam allows the student the potential to earn college credit.

AP English Literature and Composition includes intensive study of representative works from various genres and periods, concentrating on works of recognized literature of the Western World. Through close reading of selected texts, students deepen their understanding of the ways writers use language to provide both meaning and pleasure for their readers. Students will consider a work's structure, style, themes, and literary elements and how they contribute to the work's significance. Summer reading prior to the course will be required.

Course Title	Credit	Grade Offered
Pre-Flight Math	1.0	9
Algebra I	1.0	9, 10
Algebra I (H)	1.0	9, 10
Geometry	1.0	9, 10, 11
Geometry (H)	1.0	9, 10, 11
Algebra II	1.0	10, 11, 12
Algebra II (H)	1.0	10, 11, 12
Trigonometry/Pre-Calculus	1.0	11, 12
Trigonometry/Pre-Calculus (H)	1.0	11, 12
Financial Math I	0.5	11, 12
Financial Math II	0.5	11, 12
Advanced Placement (AP) Calculus AB	1.0	11, 12
Advanced Placement (AP) Statistics	1.0	11, 12

PRE-FLIGHT MATH

Prerequisite: 8th Grade Math and/or placement from New Student Orientation

Credit: 1.0

Grade Level: 9

The purpose of this course is to enhance the foundation of concepts and skills in numbers & operations, algebra, geometry, measurement, and probability & statistics in preparation for Algebra 1. In addition, students will build on their ability to solve problems, reason logically, communicate understanding, and make mathematical connections.

ALGEBRA I

Prerequisite: Pre-flight math or middle school recommendation

Credit: 1.0

Grade Level: 9, 10

The purpose of this course is to lay the concept and skill foundation for all high school and college math courses with a functions approach to algebra. Students will build on their ability to communicate with graphs and symbols and begin developing an understanding of the meaning and use of data models. They will explore ways to represent data relationships (data tables, graphs, equations, and verbal descriptions). Through reasoning and practice, students will begin to develop fluency with all algebraic operations.

ALGEBRA I HONORS

Prerequisite: Pre-flight math or middle school recommendation
Credit: 1.0
Grade Level: 9, 10

This course is a more rigorous presentation of the curriculum in Algebra I. Honors students will work with the same topics as Algebra I students, but will be expected to take on more challenging and in-depth problems related to those topics. Honors Students will be expected to complete additional assignments, a semester project, and extended assessments throughout the semester.

GEOMETRY

Prerequisite: Algebra I
Credit: 1.0
Grade Level: 9, 10, 11

In this course, students will develop skills in logic and proof, study right triangle trigonometry, and expand their knowledge of transformations, coordinate geometry, measurement formulas, and 3-dimensional figures. They will learn to apply their knowledge to solve problems involving principles of layout, structure, and design.

GEOMETRY HONORS

Prerequisite: Algebra I & department recommendation
Credit: 1.0
Grade Level: 9, 10, 11

Taking a more rigorous and in-depth approach than Geometry, students will develop skills in logic and proof, study right triangle trigonometry, and expand their knowledge of transformations, coordinate geometry, measurement formulas, and 3-dimensional figures. They will learn to apply their knowledge to solve problems involving principles of layout, structure, and design. Additional topics of study include symbolic logic, exploring the Golden Ratio, and trigonometric topics such as the unit circle and polar coordinates.

ALGEBRA II

Prerequisite: Algebra I and Geometry
Credit: 1.0
Grade Level: 10, 11, 12

This course emphasizes linear, exponential, logarithmic, trigonometric, polynomial, and other special functions for their abstract properties and as tools for modeling real world situations. Concepts from algebra and geometry will lead to skills in data analysis, discrete math, and trigonometry.

ALGEBRA II HONORS

Prerequisites: Algebra I, Geometry & department recommendation
Credit: 1.0
Grade Level: 10, 11, 12

This course is a more rigorous presentation of the curriculum in Algebra II. Students will work with the same topics as Algebra II students, but will be expected to take on more challenging and in-depth problems related to those topics. Students will be expected to complete additional assignments, a semester project, and extended assessments throughout the semester.

TRIGONOMETRY/PRE-CALCULUS

Prerequisite: Algebra II
Credit: 1.0
Grade Level: 11, 12

This course introduces students to trigonometric concepts of polar and parametric functions, conic sections, and logistic modeling. Linear, exponential, logarithmic, trigonometric, and polynomial functions, as well as matrices will also be studied in depth. In addition, the course provides a solid foundation for calculus by expanding students' understanding of the usefulness of data models, honing their ability to make sense of data tables and symbolic expressions, and establish fluency with symbol manipulation techniques. Students will examine both algebraic and non-algebraic functions and relationships, including exponential, logarithmic, composite, rational, and trigonometric. Such functions are used in many scientific endeavors and occupations. Lastly, students will be introduced to AP Calculus content including continuity, limits, and derivatives.

TRIGONOMETRY/PRE-CALCULUS HONORS

Prerequisites: Algebra II & department recommendation
Credit: 1.0
Grade Level: 11, 12

This course is a more rigorous presentation of the curriculum in Trigonometry and Pre-Calculus. All of the state standards will be covered. Additional topics of study include: more in-depth analysis of trigonometric graphs including tangent and the reciprocal functions, analytic trigonometry and verification of identities, physics applications of vectors, matrix computations, and introductory AP Calculus content including continuity, limits, and derivatives.

FINANCIAL MATH I

Prerequisite: Completion of or concurrent enrollment in Algebra II
Credit: 0.5
Grade Level: 11, 12

This course is recommended for students who have completed Algebra II and are looking for a career in any aspect of business. This course is comprised of 8 major units that have applications in real-life mathematics. Units are as follows: Life after high school, consumer awareness and expenses, income savings and taxes, budgets, bargain shopping and negotiation, credit and debt, housing and insurance, investing, and retirement. Common skills that will be applied include percentage, proportions, and “everyday” mathematics.

FINANCIAL MATH II

Prerequisite: Completion of or concurrent enrollment in Algebra II
Credit: 0.5
Grade Level: 11, 12

This course is recommended for all students and is designed to teach beginner and intermediate skills necessary to be successful with spreadsheets. Aspects covered in this class will be: cell and data manipulation, formatting and conditional formatting, formulas with cell references, and creating charts and graphs. Students will see how setting up a proper spreadsheet will save them time and effort in the long run while helping to keep them organized.

ADVANCED PLACEMENT (AP) CALCULUS AB

Prerequisites: Trigonometry/Pre-Calculus & department recommendation
Credit: 1.0
Grade Level: 11, 12

This course follows the guidelines provided by the College Board for Advanced Placement courses. Functions, their graphs, their limits (including one-sided limits), and the property of continuity are covered in detail. Rate of change and the derivative at a point on a function and the derivative of the entire function, along with integrals of functions are also studied which culminate in the use of the Fundamental Theorem of Calculus. The course concludes with the *Advanced Placement Calculus AB* exam offered in May.

ADVANCED PLACEMENT (AP) STATISTICS

Prerequisites: Algebra II & department recommendation
Credit: 1.0
Grade Level: 11, 12

Students will investigate data patterns with density and normal curves and study statistical correlation of data. Students will design experiments and study probability with discrete, continuous, binomial and geometric distributions. Students will be able to interpret results using significance tests and make inference for distributions, proportions, Chi-Square procedures and regression models. Students are encouraged to take the Advanced Placement Statistics examination. Reading and problem solving are emphasized throughout the course

Course Title	Credit	Grade Offered
Physics of the Universe	1.0	9
Physics of the Universe Honors (H)	1.0	9
Chemistry of the Earth	1.0	10
Advanced Placement (AP) Chemistry	1.0	10, 11, 12
Biology of the Earth	1.0	11,12
Advanced Placement (AP) Biology	1.0	12, 12
The Art of STEM	0.5	11, 12
Anatomy and Physiology	1.0	11, 12
Advanced Placement (AP) Physics 1	1.0	11, 12

PHYSICS OF THE UNIVERSE

Prerequisite: None

Credit: 1.0

Grade Level: 9

This year-long course will combine physics concepts with the space sciences. The storyline concepts that are found in this course include *Forces & Motion*, *Forces at a Distance*, *Energy Conservation*, *Nuclear Processes*, *Waves & Electromagnetic Radiation*, and *Stars & the Origin of the Universe*. Observations of the crosscutting concepts will be discussed throughout the course as students explore patterns, cause & effect relationships, scales, systems & models, energy flows & matter cycles, structure & function connections, and notions of stability & change. Students will also investigate natural phenomena by designing and implementing experiments that help them to better understand the physical world around them.

PHYSICS OF THE UNIVERSE HONORS

Prerequisite: None

Credit: 1.0

Grade Level: 9

This course is intended to introduce freshmen to the fundamentals of physics and the universe through extensive experimentation, discourse, reading and writing using common science practices and engineering principles modeled through all science courses at West Michigan Aviation Academy. Students will investigate topics including forces in motion, forces at a distance, energy conversion, nuclear processes, waves & electromagnetic radiation, and stars & the origin of the universe. This course will include a more rigorous application of reading, writing, and math as well as more student-designed experimentation than Physics and will serve as an excellent stepping stone to AP Physics and The Chemistry of the Earth. Students will be required to completed an additional paper in the first semester and take part in the science exhibit the second semester.

CHEMISTRY OF THE EARTH

Prerequisite: Physics of the Universe

Credit: 1.0

Grade Level: 10

This year-long course will combine physics concepts with the space sciences. The storyline concepts that are found in this course include *Combustion, Heat & Energy in the Earth System, Atoms, Elements, & Molecules, Chemical Reactions, Chemistry of Climate Change, and the Dynamics of Chemical Reactions & Ocean Acidification*. Observations of the crosscutting concepts will be discussed throughout the course as students explore patterns, cause & effect relationships, scales, systems & models, energy flows & matter cycles, structure & function connections, and notions of stability & change. Students will also investigate natural phenomena by designing and implementing experiments that help them to better understand the physical world around them.

ADVANCED PLACEMENT (AP) CHEMISTRY

Prerequisites: Physics of the Universe and department recommendation

Credit: 1.0

Grade Level: 10, 11, 12

AP Chemistry is designed to be a rigorous course that is the equivalent to a first-year college course. This class will include topics such as atomic structure/theory, chemical bonding, nuclear chemistry, states of matter, reaction types, equilibrium, kinetics, and thermodynamics. Students who enroll in this course are encouraged to take the AP Chemistry Exam in May.

BIOLOGY OF THE EARTH

Prerequisite: Chemistry of the Earth or AP Chemistry

Credit: 1.0

Grade Level: 11

This year-long course will combine physics concepts with the space sciences. The storyline concepts that are found in this course include *Ecosystem Interactions & Energy, Photosynthesis & Respiration, Evidence of Evolution, Inheritance of Traits, Structure, Function & Growth, and Ecosystem Stability & the Response to Climate Change*. Observations of the crosscutting concepts will be discussed throughout the course as students explore patterns, cause & effect relationships, scales, systems & models, energy flows & matter cycles, structure & function connections, and notions of stability & change. Students will also investigate natural phenomena by designing and implementing experiments that help them to better understand the living world around them.

ADVANCED PLACEMENT (AP) BIOLOGY

Prerequisites: Chemistry of the Earth or AP Chemistry and department recommendation
Credit: 1.0
Grade Level: 11, 12

AP Biology is a rigorous and demanding course, which is the equivalent of an introductory college biology course. Content will be covered in more depth and greater expectations will be placed on interpretation and analysis of information than previous biology courses. The main four areas of study are Cells, Genetics, Evolution and Ecology. Crosscutting concepts will be analyzed throughout the year. In addition, statistical analysis of data and modeling of concepts will be expected. A significant amount of studying must be completed at home to allow time for discussion, labs, and inquiry during class time. Students who enroll in this course are encouraged to take the AP Biology Exam in May.

THE ART OF STEM

Prerequisite: None
Credit: .5
Grade Level: 11, 12

The Art of STEM is an interdisciplinary elective course that uses the study and creation of art as a creative way to learn and apply Science, Technology, Engineering, and Math principles. During each project-based unit of study, students will explore specific STEM concepts in and through the arts. Each project will culminate with students creating a unique work of art that integrates STEM standards and practices. For instance, students will use an engineering approach to design dynamic sculptures, they will create portraits inspired bio-mathematical and scientific patterns found in nature, and they will utilize technology to incorporate industrial and graphic design elements to their artwork. This semester course will blend art and design with STEM to foster and fuel innovation. No prior art experience or skill level is required to be successful in this course. Instead, innovation requires a sense of wonder, a vision, dedication, and the ability to think critically and creatively!

ANATOMY AND PHYSIOLOGY

Prerequisite: Biology of the Earth
Credit: 1.0
Grade Level: 11, 12

This class will start with a basic overview of biological systems and their functions. Students will learn interactions between the levels of organization of the human body and the individual parts of each level. The anatomy and function of each of these systems will be discussed throughout the class: integumentary, skeletal, muscular, nervous, endocrine, cardiovascular, lymphatic and immune, respiratory, digestive, urinary, and reproductive. The anatomical planes and sections will also be studied in order to understand the overall structure of the body. This is a great class for any student interested in expanding on what they learned in *Biology* class and interested in pursuing a career in any health field.

ADVANCED PLACEMENT (AP) PHYSICS 1

Prerequisites: Algebra II and Physics of the Earth

Credit: 1.0

Grade Level: 11, 12

AP Physics 1 is an algebra-based, introductory college-level physics course. Students cultivate their understanding of physics through inquiry-based investigations as they explore topics such as Newtonian mechanics (including rotational motion); work, energy, and power; mechanical waves and sound; and introductory, simple circuits. This class is equivalent in scope and rigor to a first-year college physics class. Students who enroll in this course are encouraged to take the corresponding AP exam.

Course Title	Credit	Grade Offered
World History	1.0	9
World History (H)	1.0	9
U.S. History	1.0	10
Advanced Placement (AP) U.S. History	1.0	10
Government	0.5	11
Advanced Placement (AP) United States Government and Politics	0.5	11
Economics	0.5	11
Advanced Placement (AP) Macroeconomics	0.5	11
Psychology	1.0	11, 12
Child Development	0.5	11, 12
Sociology	0.5	11, 12
World Cultures	0.5	11,12
Current Issues	0.5	11, 12
Human Geography	0.5	11, 12
AP Psychology	1.0	11, 12

WORLD HISTORY

Prerequisite: None

Credit: 1.0

Grade Level: 9

This course covers the history, geography and current issues of the Middle East, Asia, Africa, Europe, and the Americas. The social changes, political systems, rise and fall of empires and civilizations, technological advances, religions, and cultural achievements will be studied in the context of each cultural era. Through the analysis of primary source documents and other artifacts, students are encouraged to make connections between the past and present.

WORLD HISTORY HONORS

Prerequisite: None

Credit: 1.0

Grade Level: 9

This course covers the same topics as *World History* (history, geography and current issues of the Middle East, Asia, Africa, Europe, and the Americas) but will progress at a faster pace and will include more in-depth reading and writing. The social changes, political systems, rise and fall of empires and civilizations, technological advances, religions, and cultural achievements will be studied in the context of each cultural era. Through the analysis of primary source documents and other artifacts, students are encouraged to make connections between the past and present.

U.S. HISTORY

Prerequisite: None
Credit: 1.0
Grade Level: 10

United States History combines American history, geography, and civics standards and is aligned with the Michigan Merit Curriculum. The course covers the history of the U.S. from the Reconstruction Era to the present. Topics of study include the Reconstruction of the U.S. after the Civil War; Native American culture, influence, and experiences; cultural and political movements and reforms surrounding industrialization, urbanization, progressivism, the Roaring '20s, and civil rights; and domestic and foreign policies and conflicts regarding WWI, the Great Depression, WWII, the Cold War era, and U.S. responses to terrorism both domestically and abroad. Critical thinking and analytical skills are emphasized throughout the course along with the use of primary source documents with a strong emphasis placed on reading and interpreting complex documents and written expression involving summarizing, making connections, and reflecting.

ADVANCED PLACEMENT (AP) U.S. HISTORY

Prerequisite: Department Recommendation
Credit: 1.0
Grade Level: 10

This course is a comprehensive, accelerated, college-level survey course encompassing North American and United States history and geography from the colonial era to the present. The intent is to develop an understanding of the key people, events, ideas, issues, and trends throughout our history that have defined who and what we are today. Critical and evaluative thinking ability will be honed through shared research, class discussions, essay writing and the interpretation of primary and secondary source documents. College credit can be earned by demonstrating understanding of information and ideas on the College Board AP US History exam, which students will be encouraged to take. This course is considerably more challenging and demanding than most high school courses and requires a great commitment. The class will help strengthen students' ability to assess historical materials, their relevance to a given interpretive problem, their reliability, and their importance, and to weigh the evidence and interpretations presented in historical scholarship.

GOVERNMENT

Prerequisite: None
Credit: 0.5
Grade Level: 11

In this course, students will evaluate the structure and function of the United States Government at the national, state, and local levels and the rights and responsibilities of citizens within that structure. The course covers the fundamental ideas, functions and processes that form the basis of the American political system. Areas to be addressed include power, authority, and government; foundations of American government; political participation and behavior; legislative, executive, and judicial branches of government; and the United States and the world.

ADVANCED PLACEMENT (AP) UNITED STATES GOVERNMENT AND POLITICS

Prerequisite: Department Recommendation
Credit: 0.5
Grade Level: 11

The course provides an analytical perspective on United States government and politics. This course includes both the study of general concepts used to interpret U.S. politics and the analysis of specific case studies. It also requires familiarity with the various institutions, groups, beliefs, and ideas that constitute U.S. political reality. Students will become acquainted with a variety of theoretical perspectives and explanations for various behaviors and outcomes. Current political, legal, and government issues will be used to illustrate major concepts and refine the student's understanding of the American political system. AP U.S. Government and Politics will provide students with a true college atmosphere in content, pacing, and instruction. Emphasis will be placed on critical and higher-level thinking skills and essay writing. The course will challenge a student's ability to think and analyze material critically, and also give them an opportunity to earn college credit by their performance on the AP exam.

ECONOMICS

Prerequisite: None
Credit: 0.5
Grade Level: 11

The *Economics* course enables students to understand and consider potential implications of basic scarcity, a problem faced by all individuals, businesses, and societies. From personal decisions to global concerns, economics teaches students how to successfully evaluate the concept of choice. Through weighing both short- and long-term costs and benefits, examining alternatives, and anticipating intended and unintended consequences of economic choices, students will be prepared as citizens to make personal and societal decisions regarding the market economy, the national economy, the international economy, and personal finance. Units of study include economic fundamentals, how markets work, economic institutions and organizations, economics of the public sector, measuring and monitoring the economy, and the U.S. and the global economy.

ADVANCED PLACEMENT (AP) MACROECONOMICS

Prerequisite: Department Recommendation
Credit: 0.5
Grade Level: 11

The course is a one-semester study of the principles of economics that apply to the economic system as a whole with particular emphasis on the analysis of national income and price determination, government spending and taxation, money, banking, monetary policy and international trade. Students will also become familiar with economic performance measures, economic growth, the financial sector, stabilization policies, and international economies. This course is taught with the purpose of preparing students to take the AP Macroeconomics Exam and the possibility of receiving college credit.

PSYCHOLOGY

Prerequisite: None
Credit: 1.0
Grade Level: 11, 12

Psychology is a yearlong course that introduces the basic principles of psychology. Throughout the course we will evaluate why humans behave the way that they do. We will look in depth at the human brain, conditioning, sensation and perception, memory, sleep, human development, what motivates us, what forms our personality, theories of emotion, and psychological disorders. Students will explore the world of psychology through discussions, hands-on projects, and activities.

CHILD DEVELOPMENT

Prerequisite: None
Credit: 1.0
Grade Level: 11, 12

This class will explore developmental psychology and the different stages children go through from birth to adulthood. Developmental psychology will be applied through career exploration units that all center around working with children. Careers that we will interact with include day care, education, social work, pediatrics, and government. This class is designed for people who have an interest in working with children or learning more about the development of a child.

SOCIOLOGY

Prerequisite: None
Credit: 0.5
Grade Level: 11, 12

This introductory course examines the principles and methodology of sociology, the study of the development, structure, and functioning of human society and the study of social problems. Groups, the group process, and institutions will be a focus of the course. Controversial social issues may be researched and discussed, such as substance abuse, crime, terrorism, poverty, racism, and death and dying. Critical thinking, role-playing, and group discussion will be required.

WORLD CULTURES

Prerequisite: None
Credit: 0.5
Grade Level: 11, 12

This cultural and regional survey course will examine the various cultures of the modern world. The historic, social, cultural, economic, geographic, and religious aspects of several of the major world regions will be examined comparatively in order to provide students with an understanding of the various and diverse regions of the world. The course will provide students with a global framework and understanding in which they will be expected to articulate cross-cultural themes.

CURRENT ISSUES

Prerequisite: None
Credit: 0.5
Grade Level: 11, 12

The purpose of this one-semester class is to improve students' ability to understand what is going on in the world through reading, watching, and listening to a variety of media. Through this course, students will have a greater appreciation for the complexities of world issues and will apply this understanding to becoming a global citizen. Students will examine and write about current world issues in government, economics, and global issues, as well events in the aviation industry.

HUMAN GEOGRAPHY

Prerequisite: World History or World History Honors
Credit: 0.5
Grade Level: 11, 12

This course provides an introduction to Human Geography. In this course students will research and analyze problems of economic development and cultural change, consequences of population growth, impacts of technological innovation on transportation, communication, and industrialization. Students will also research and analyze struggles over political power and control of territory, conflicts over the demands of ethnic minorities, the role of women in society, and the inequalities between developed and developing economics. Explanations of why location matters to agricultural land use, industrial developments, and urban problems. The role of climate change and environmental abuses in shaping the human landscapes on Earth will also be covered.

ADVANCED PLACEMENT (AP) PSYCHOLOGY

Prerequisite: None
Credit: 1.0
Grade Level: 11, 12

AP Psychology serves motivated students seeking to understand human behavior from a scientific perspective. The course surveys and analyzes history, research, biology, social psychology, personality, stress and health, abnormal psychology, development, learning, intelligence, memory and more. Success in the course may facilitate success on the AP exam and may allow student the potential to earn college credit.

Course Title	Credit	Grade Offered
Spanish I	1.0	9
Spanish II	1.0	9, 10
Spanish II Honors	1.0	10
Spanish III	1.0	10, 11
Spanish IV	1.0	11, 12
Advanced Placement (AP) Spanish Language and Culture	1.0	11, 12

In Spanish, students will develop written, spoken, and cultural Spanish, using the Michigan Foreign Language Standards of:

- Communication (written and spoken),
- Culture (the practices and perspectives of groups of people),
- Connections (between other disciplines and languages and Spanish),
- Comparisons (of the Spanish language and cultures and your own), and
- Communities (using Spanish in and outside of the classroom).

The aim of the Spanish department is to develop the four main language skills of speaking, writing, reading, and listening in order to use Spanish in a wide range of settings and careers, in aviation and beyond. Additionally, students will learn what it means to be a global learner, prepared to meet the challenges of the contemporary world. A heavy emphasis of Spanish will be on making connections to different Hispanic cultures and countries throughout the world, as well as engaging with the vibrant Hispanic community in Grand Rapids.

SPANISH I

Prerequisite: None
 Credit: 1.0
 Grade Level: 9

This course is designed for beginning students of Spanish or students whose background demands a thorough review of the basics of the language. Students will learn basic communication skills in culturally relevant settings. These skills will be refined through a variety of methods, including repetition, TPS (total physical response), and TPRS (teaching proficiency through reading and storytelling).

SPANISH II

Prerequisite: Spanish I or Department Recommendation
Credit: 1.0
Grade Level: 9, 10

A continuation of *Spanish I*, *Spanish II* entails an extensive review and the development of more specialized vocabulary and grammatical usage. Students will be introduced to different verb tenses, allowing them to speak in the past and future and expanding communication skills. A variety of methods and teaching styles will be used to increase skills of verbal and written communication. Listening and speaking activities are increasingly used. A greater emphasis will be placed on making connections to the community.

SPANISH II HONORS

Prerequisites: Spanish I and Department Recommendation
Credit: 1.0
Grade Level: 10

Spanish 2 Honors is designed for students who have excelled in Spanish 1 at WMAA. All of the units from Spanish 2 general sections are covered, as well as the main grammatical concepts and vocabulary from Spanish 3. Spanish 2 Honors is a faster paced course, conducted primarily in Spanish, and meant to prepare students for Spanish 4 the following year. Listening comprehension and speaking are more emphasized, and students will work on developing professional writing skills.

SPANISH III

Prerequisite: Spanish II or Department Recommendation
Credit: 1.0
Grade Level: 10, 11

Spanish III is designed to be taken by previously successful students of Spanish who wish to further enhance their Spanish language skills. While reinforcing and building students' grammatical knowledge and writing skills, the focus of the class will be on communication and literacy. At this level students are equipped with authentic materials and expected to show both comprehension and real-world application.

SPANISH IV

Prerequisite: Spanish II Honors, Spanish III or Department Recommendation

Credit: 1.0

Grade Level: 11, 12

This course, which will be conducted almost exclusively in Spanish, is designed for serious, advanced students who are interested in becoming fluent in conversational and written Spanish as well as enriching their cultural, historical, and geographical awareness of the Spanish-speaking world. Advanced authentic texts will be used for reading, conversation, composition and grammar study.

ADVANCED PLACEMENT (AP) SPANISH LANGUAGE AND CULTURE

Prerequisite: Spanish IV or Department Recommendation

Credit: 1.0

Grade Level: 11, 12

Taught exclusively in Spanish, *AP Spanish Language and Culture* course emphasizes communication by applying interpersonal, interpretive, and presentational skills in real-life situations, including vocabulary usage, language control, communication strategies, and cultural awareness. The *AP Spanish Language and Culture* course engages students in an exploration of culture in both contemporary and historical contexts. The course develops students' awareness and appreciation of cultural products (e.g., tools, books, music, laws, conventions, institutions); practices (patterns of social interactions within a culture); and perspectives (values, attitudes, and assumptions).

HEALTH AND PHYSICAL EDUCATION DEPARTMENT

Course Title	Credit	Grade Offered
Health	0.5	9
Physical Education	0.5	9
Fit for Flight	0.5	11, 12
Strength Training	0.5	11, 12
Personal Health & Wellness	0.5	11, 12
Lifetime Sports	0.5	11, 12

HEALTH

Pre-Requisite: None
Credit: 0.5
Grade Level: 9 *Required

The goal of the 9th grade *Health Education* class is to focus on the importance of maintaining good health in order to live a long, healthy, and fulfilling life. The class will emphasize the impact that physical, social, emotional, spiritual, and mental health has on an individual's performance in the classroom and within their work environment. The Health Education class will give WMAA students a chance to learn concepts and practice skills throughout a variety of units, including: Healthy Behaviors, Decision Making, Communication, Goal Setting, Advocacy, Accessing Information, Analyzing Influences, and Comprehending Concepts, CPR and First Aid.

PHYSICAL EDUCATION

Pre-Requisite: None
Credit: 0.5
Grade Level: 9 *Required

The goal of the 9th grade *Physical Education* class is to focus on the importance of developing motor, cognitive, and personal-social skills, in order for students to be happy, healthy, and active across the lifespan. The physical education class will give WMAA students a chance to learn and practice skills in a variety of activities, while learning the importance of physical activity on their personal health and well-being. Throughout the semester, WMAA students will learn how to record and track their fitness progress, by using the results of their fitness tests, which will occur three times per year. This integral part of the *Physical Education* class will emphasize the importance of being accountable for one's own health and being able to relate good health to positive performance in the classroom and in the work place.

FIT FOR FLIGHT

Prerequisite: Physical Education
Credit: 0.5
Grade: 11, 12

This course will be structured around the United States Air Force Academy fitness standards in body composition, muscular strength and endurance, as well as cardiovascular endurance. Students will learn the proper knowledge and skills necessary to enhance their personal fitness and meet the expectations of the Air Force Academy's fitness standards. Students will perform cardiovascular workouts and will engage in strength training. This program will be structured on an individual basis so each student may achieve the maximum benefit. Students will be continuously educated on proper stretching, nutrition, and lifting techniques. Grades are based the U.S. Air Force Academy standards and include performance assessments. The emphasis is on continuation of a weight-training regimen beyond class and an overall care for a healthy lifestyle.

STRENGTH TRAINING

Prerequisite: Physical Education
Credit: 0.5
Grade: 11, 12

The emphasis of this strength-training course is to build knowledge of muscular strength, endurance, and flexibility as well as the practice of each. Weight room safety, warm-up/cool down procedures, lifting technique, major muscle identification, and individual goal setting are all-important components of this course. In addition, students will monitor and improve their fitness levels by participating in assessments throughout the semester.

PERSONAL HEALTH & WELLNESS

Prerequisite: Health
Credit: 0.5
Grade: 11, 12

This class will focus on First Aid/CPR (certification included) and a more in depth look at fitness and nutrition. We will also expand on topics learned in Freshman Health including safety, social/emotional health and substance use. All topics and skills combined will give students the knowledge they need to make healthy choices and live a healthy, active lifestyle.

LIFETIME SPORTS

Prerequisite: 9th Grade PE
Credit: 0.5
Grade: 11, 12

This class will focus on learning rules and playing sports such as ultimate Frisbee, volleyball, badminton, pickle ball, floor hockey, basketball, Saturn ball, team handball, softball, kickball, and soccer.

Course Title	Credit	Grade Offered
Summit Course	1.0	9, 10, 11, 12
English Language Development (ELD)	1.0	9, 10, 11, 12
Evidence Based Literacy Instruction (EBLI)	0.5	9, 10, 11, 12
Leadership	0.5	11, 12

SUMMIT COURSE

Prerequisite: None
 Credit: 1.0
 Grade Level: 9, 10, 11, 12

The Summit course is designed to support English Learners by teaching life skills such as organization, study skills, communication, self-advocacy, career exploration, and community networking. This course is designed to fill in the gaps of life and personal skills that are not able to be taught during traditional high school content courses or English Language Development courses. Registration through department recommendation.

ENGLISH LANGUAGE DEVELOPMENT (ELD)

Prerequisite: None
 Credit: 1.0
 Grade Level: 9, 10, 11, 12

The English Language Development coursework is designed to help students work towards achieving proficiency in reading, writing, speaking, and listening in the English language. Students will receive authentic practice and instruction in the social language of English with a focus on developing fluency for multiple purposes through the use of theme based units and informational text, students will be exposed to a variety of texts to build background and students will produce writing for academic purposes. Students will work to increase their vocabulary in academic contexts, continue to develop their listening comprehension and increase their fluency by repeated practice of text designed to expose students to content specific topics.

EVIDENCED BASED LITERACY INSTRUCTION (EBLI)

Prerequisite: None
Credit: 0.5
Grade Level: 9, 10, 11, 12

Evidence Based Literacy Instruction (EBLI) is a research-based program designed to teach students how to read fluently, become a better writer, and spell correctly. Spelling patterns are taught in the context of writing and misspelled words are corrected immediately. Correct writing conventions are modeled and practiced. Students will be exposed to a variety of engaging texts and will work towards identifying the main idea, writing concise summaries, and participating in literature circles. This course is divided into 2 parts. The first half is made up of 30 intensive units to train students in EBLI, and the second half consists of students implementing what they've learned. Students will track their weekly progress, participate in independent and group center readings and activities, and will monitor their reading fluency, comprehension, and growth. Students will be throughout the semester for their personal growth in reading speed, fluency, spelling, and writing.

LEADERSHIP

Prerequisite: None
Credit: 0.5
Grade Level: 11, 12

In Leadership, students will be exposed to different perspectives on the topic through engagements with modern media, class discussions, and a variety of texts. The course will emphasize public speaking skills ranging from civil in-class debates to independent and group presentations. Through a combination of in-class activities, hands-on lessons, and authentic opportunities to engage in civic leadership outside of the classroom, students will learn from the examples of others while becoming models of leadership themselves. The class culminates in the presentation and reflection of a semester long project in authentic servant leadership. This class deals with questions like: What is modern leadership? How has it changed or evolved? How can we be everyday leaders? What are the necessary qualities to lead?