MARET | UPPER SCHOOL CURRICULUM TECHNOLOGY

Elective: *All courses are 1 credit.*
Chair: *Martha Cunningham*

The purpose of technology education is to teach students the academic use of computers to improve writing and research skills, to develop and reinforce programming aptitude, and to express creativity. The Technology Department offers courses in programming languages from introductory to advanced levels. Additionally the department supports the development of computer skills necessary for other department courses.

A computer literate Maret student achieves competence in word processing, spreadsheet calculations, multimedia, web-based research, and presentation software. The emphasis on teaching programming languages exposes interested students to computer science. Students come to understand a computer's strengths and limitations and, at the same time, learn the computer skills they will need at college and beyond.
A fully-equipped laboratory with twenty computers is open for academic use from 8 a.m. until 5 p.m. Computers are also available in the library, science lab and many other locations around campus. There is a campus-wide wireless network enabling access from any wireless-capable device, as well as several laptop and tablet carts supporting computer use in the classroom. Each student receives a Maret email account, which is accessible from anywhere through the Internet. Extracurricular use of computers include publications of the newspaper, yearbook, Literary and Visual Arts Magazine, and projects of the Engineering Team.

Programming and Design Fundamentals

This course will explore the design process from the concept phase to creating a software program. The expectation is that students are new or have very little experience with programming. Students will study the design process from simple to complex systems, design and learn the fundamental concepts of programming using various coding methods. Drawing upon the process of game design students will create their own games and programs incorporating object oriented programming skills such as defining parameters and variables, if/then statements, looped processes, and recursive statements.

Computer Science and Programming in Java

This course is an introduction to the syntax and organization of Java, the use of object-oriented programming concepts and the standard constructs of arrays, recursion, searching, and sorting. Students write many small programs and then go on to work on larger projects, which have included graphical games through applets, small database applications, graphing calculators, web-based email and calendar checkers. This course prepares students to take the AP Computer Science A Exam in May. The course is designed to be a combination of a self-paced online course using open courseware, with classroom support through a 70 minute seminar class each week. Students will be expected to spend three classes a week programming independently and in small groups to practice the techniques and build a code portfolio.

Advanced Computer Programming (MSON)

Data Structures and Algorithms in Java: this year-long course continues and deepens students' understanding and practice of object-oriented programming. Students are expected to have familiarity with programming in Java at the AP Computer Science A level. Core topics in the context of the Java programming language include practical implementations of fundamental and more advanced data structures (linked lists, hash

encoded storage, binary search trees - AVL, treaps, red-black trees, and heaps), algorithms for organizing and manipulating data (including sorting, searching, and traversal algorithms), and time complexity of algorithms in a problem-solving oriented context. In-depth exploration of standard Java libraries and features such as Java Collections, error handling, threads, and designing and building graphical user interface using AWT and Swing libraries is included. Much of the course is project-based, with assignments stressing the design of classes and algorithms appropriate to a particular problem.

App Design and Development (MSON)

(Spring Semester)

Prerequisite: *Algebra I and an Introductory Computer Science course. Course targets students in grades 9 and 10.*

In this course students will learn the app development process from the idea stage through prototyping and testing to final product delivery. The course emphasizes creating flexible data structures, code management, usability, and efficient coding skills. Apps will be developed for Android and iOS devices. Coursework will include individual and group projects.

Computer Science: Interactive Digital Ideas Through Creative Game Design (MSON)

(Fall Semester)

This is the first of a two-course class sequence where students will learn advanced computational and problem solving skills as they learn to turn their own creative ideas into something real on their screens. Students choose a topic that is important and interesting to them, and we'll spend the semester creating a 2-D interactive, fun, and engaging digital experience around that topic. Students can expect to write from several hundred to a couple thousand lines of code in the C# (C-Sharp) language. In addition to learning about interactive game industry itself, we'll also look at the business of, and strategies behind, creating a successful game. Students will need a desktop or laptop running Windows 7, 8, or 10. (Virtual Machines will not work. Bootcamp is acceptable.) In addition, students will use the Microsoft Visual Studio IDE.

COMPUTER SCIENCE: INTERACTIVE HUMAN MOVEMENT THROUGH PHYISCAL ACTION (MSON)

(Spring Semester)

Prerequisite: *Intermediate programming skills and C# (C-Sharp)/ Visual Studio experience required.*

This is the second of a 2-course class sequence that uses physical motion and 3D position as the "input device," instead of a keyboard or mouse. Students can expect to write from several hundred to several thousand lines of code in the C# (C-Sharp) language. Students choose a topic that is important and interesting to them, but that also has physical movement as a major component. (For example: injury rehabilitation, Yoga training, or sport form analysis.) Students will spend the semester learning to take raw data in real time from the Kinect camera and interpret into their programs. We'll also investigate the place for alternative input devices in society and explore the entrepreneurship/business side of Computer Science by analyzing actual competing products, studying demographics and target audience, designing effective marketing and promotion campaigns, and developing salesmanship. Students will need a desktop or laptop running Windows 7, 8, or 10. (Virtual Machines will not work. Bootcamp is acceptable). Students will use the Microsoft Visual Studio IDE. C# and Visual Studio are both used in industry.

Independent Study: Special Topics in Computer Science

Students that show exceptional talent in computer science have the option to submit a proposal for an independent study in computer science. The proposal must be submitted to the department chair and the faculty sponsor for approval.