

Apogee Program Session 1

Course Title: Bits & Blocks: Introduction to Computer Programming

Instructor: TJ Leone

Teaching Assistant: Alexandra Damisch

Course Description

Have you wondered how you control every movement on the screen while playing video games? Students unlock the mysteries behind the computer screen as they investigate fundamental concepts in computer programming. Using MicroWorlds software, students explore and test their ideas and develop their own 2-D multimedia projects and computer games, complete with animation, sound effects, movie clips, and music. This course encourages students to use their imagination and math skills, solve problems, and think creatively while developing simple computer programs. Students receive a copy of MicroWorlds.

Essential Questions

- What is a procedure?
- What is the difference between a command and reporter?
- How can written procedures, keywords and primitives be combined to build projects?
- How can values be stored, incremented, compared, accumulated, transformed, organized, and shared?

Outcomes

Upon successful completion of this course, students will:

- Make and modify Microworlds EX objects by direct manipulation and programmatically with LOGO
- Use resources available in the Microworlds EX environment as guides for project development
- Build, test and debug LOGO programs
- Create animations
- Use LOGO and the Microworlds EX environment to create single or multiple 2-D games

Instructional Strategies

This course is given at an accelerated pace, exposing children to curriculum that would normally be covered over the course of a year. As a programming course, this course is heavily problem based. In order to accommodate the range of skills and interests that students bring to this course, we will rely heavily on independent study, using tiered activity as appropriate to make sure that each student is working at an appropriate level of challenge. We will use flexible grouping as opportunities arise for students to learn from one another.

Resources and Materials

- **Books**
 - a. Text for the course consists of handouts and PDF files prepared by the instructor.
- **Web sites**
 - a. tjleone.com. Instructor's web site includes a "Camp Logo" section with lessons, articles, homework, online activities, sample projects, links and videos for self-paced learning.

- b. microworlds.com. Publishers of MicroWorlds EX
- c. Students may also search other appropriate sites for information and media as needed.
- **Materials**
 - a. Microworlds EX/LOGO programming environment, Logo Computer Systems, Inc.

Student Assessment

- **Pre-Assessment**
On day one, students will be given challenges to demonstrate background knowledge or show what they are learning about the MicroWorlds environment.
- **Documentation of Learning**
Student work will be recorded in a range of coding challenges and projects, comments in their code, and a paper and pencil or electronic journal. The journal will be used to keep track of coding techniques, procedures, aspects of programming environments, and programming concepts learned in class.
- **Post-Assessment**
On the last day of class, students will demo their course projects.

Schedule

Date	Topic(s)	In-class Activities	Assignments/Assessments
07/01/13	Overview of MicroWorlds Environment	Pre-Assessment, Exploration of environment and discussion	Vocabulary Hands on work Handout
07/02/13	Turtles: State, Shapes and Rules	Analysis of turtle instructions/Playing Logo 1	Vocabulary Hands on work Handout
07/03/13	Pages and Wallpaper	Cleaning up and decorating pages	Vocabulary Hands on work Handout
07/04/13	Advanced Turtle Techniques	Finding, reading and using built-in MicroWorlds resources on color and collision detection, messages, When this/Do that	Vocabulary Hands on work Handout
07/05/13	Graphics	Presentation of projects	Vocabulary Hands on work Handout
07/08/13	Procedures	Creating and solving puzzles for mystery messages and mystery numbers	Vocabulary Hands on work Handout
07/09/13	Variables	Analysis of turtle instructions/Playing Logo 2	Vocabulary Hands on work Handout
07/10/13	Predicates	Finding, reading and using built-in MicroWorlds resources on writing procedures to use check boxes, round button sets, list boxes, drop downs and keyboard input Assessment	Vocabulary Hands on work Handout
07/11/13	Manipulating and invoking instruction lists	Finding, reading and using built-in MicroWorlds resources on (1) writing procedures with dolist, dotimes, everyone, run, (2) sending instruction lists as messages, and (3) setting turtle rules and color detection rules programmatically	Vocabulary Hands on work Handout

Date	Topic(s)	In-class Activities	Assignments/Assessments
07/12/13	Recursion, Turtle Geometry	Presentation of projects	Vocabulary Hands on work Handout
07/15/13	Process Management	Finding, reading and using built-in MicroWorlds resources on process management	Vocabulary Hands on work Handout
07/16/13	Project work	Completing session projects	Vocabulary Hands on work Handout
07/17/13	Project work	Completing session projects	Vocabulary Hands on work Handout
07/18/13	Project work	Completing session projects, Post-Assessment	Vocabulary Hands on work Handout
07/19/13	Project work	Completing session projects	Vocabulary Hands on work Handout

Instructor Biography

TJ Leone has taught over twenty math and computer science courses at CTD since 2002, including ten sessions of Bits & Blocks. He currently tutors K-14 students in math and computer science. He has also worked as a teacher at Chiaravalle Montessori School and an educational software developer at Northwestern University. He has a BA in Math and an MS in Computer Science from the City College of New York and an M.Ed. in Montessori Elementary Education from Loyola College in Maryland, as well as graduate work in Computer Science and Learning Sciences at Northwestern. He holds a Montessori teacher certification from the Association Montessori Internationale and is a Sun certified Java programmer.

Contact Information

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CTD Statement on Third-Party Web Sites

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility for any of the content contained on third-party web sites used in course materials. If you become aware of anything that may be inappropriate, please notify CTD staff immediately.