Center for Talent DEVELOPMENT
NORTHWESTERN UNIVERSITY
School of Education & Social Policy

COURSE SYLLABUS

SUMMER PROGRAM 2010

617 Dartmouth Place · Evanston, IL 60208 · 847/491-8257
Summer Office: June 14 – August 11, 2010 · 847/467-2990

Apogee Program
Session 1
Instructor: TJ Leone
Teaching Assistant: TBA

Course Title

Bits and Blocks: Computer Programming

Course Description

Have you wondered how you control every movement on the screen while playing video games? Programmers design the coordination of each and every possible move. 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

Essential Questions

How can I use the Microworlds EX programming environment to develop a project? How do I use the information available in the Microworlds environment and on the web to help me when I get stuck?

Outcomes

Upon successful completion of this course, students will:

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

Instructional Strategies

Use one to two paragraphs to describe (in narrative format) the instructional strategies that will be utilized in the course to differentiate instruction (tiered assignments, flexible grouping, etc.).

Resources and Materials

a. Books*: Harvey, Brian, Computer Science, Logo Style: Volume 1: Symbolic Computing, 1997/2nd Edition, ISBN 0-262-58148-5, available in free downloads at http://www.eecs.berkeley.edu/~bh/v1-toc2.html.*
b. Web sites*: tjleone.com (Instructor's web site. Information for parents and students on course content as well as links to other sites relevant to the course.)*
c. Other Media *(articles, course packs, etc.): Handouts developed by instructor.*
d. Materials*: Journal (option for students who prefer using paper and pencil rather than electronic documents to record reflections on their work).*

Student Assessment

a. Pre-Assessment: *On day one, students will be given the opportunity to explore the Microworlds environment. During this time, students will be assessed for their ability to use direct manipulation to develop a project, and any background knowledge they have about Logo programming.*

b. 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.*
c. Post-Assessment: *The Expo! activity will be an open house for parents at which students will have the opportunity to demo their programs.*

Schedule

Please indicate specific instructional strategies that you plan to use to present the topic and how you plan to differentiate instruction (tiered assignments, flexible grouping, etc.) for student's varied level of ability.

Date(s)	**Topic(s)**	**In-class Activities**	**Documentation of Learning**
6/27/2010	Overview of Berkeley Logo Environment	Exploration of environment and discussion	Code, code comments, paper or electronic record of procedures or concepts learned.
6/28/2010	Procedures, variables and predicates	Tracing procedures	Code, code comments, paper or electronic record of procedures or concepts learned.
6/29/2010	Functions of functions	Numeric iteration, functions, map, filter, reduce, anonymous functions, cascade	Code, code comments, paper or electronic record of procedures or concepts learned.
6/30/2010	Project work	Mastermind	Code, code comments, paper or electronic record of procedures or concepts learned.
7/1/2010	Project work	Mastermind	Code, code comments, paper or electronic record of procedures or concepts learned.
7/5/2010	Introduction to recursion: Martin and the Dragon	recursively visiting items in lists, including numbers, turtles and other objects	Code, code comments, paper or electronic record of procedures or concepts learned.
7/6/2010	Recursive math functions and series	Martin and the Dragon: factorial, exploration of other functions and series	Code, code comments, paper or electronic record of procedures or concepts learned.
7/7/2010	The three rules of recursion: • know when to stop • decide how to take one step • break the journey down into that step plus a smaller journey	Write recursive procedures with bases, step changes, and stop rules	Code, code comments, paper or electronic record of procedures or concepts learned.

7/8/2010	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	Code, code comments, paper or electronic record of procedures or concepts learned.
7/9/2010	Recursion, Turtle Geometry	Presentation of projects	Code, code comments, paper or electronic record of procedures or concepts learned.
7/12/2010	Process Management	Finding, reading and using built-in MicroWorlds resources on process management	Code, code comments, paper or electronic record of procedures or concepts learned.
7/13/2010	Project work	Completing session projects	Code, code comments, paper or electronic record of procedures or concepts learned.
7/14/2010	Project work	Completing session projects	Code, code comments, paper or electronic record of procedures or concepts learned.
7/15/2010	Project work	Completing session projects	Code, code comments, paper or electronic record of procedures or concepts learned.
7/16/2010	Project work	Presentation of projects	Code, code comments, paper or electronic record of procedures or concepts learned.

Instructor Biography

TJ Leone has taught over twenty math and computer science courses at CTD over a period of eight years, including eight sessions of Bits & Blocks. For the last three years, he has taught at Chiaravalle Montessori School in Evanston. Before that, he worked as 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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