nclab
More Than Coding

An Overview

# Teaching Soft, Hard, and Applied STEM Skills

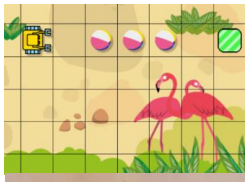
The game-based courses in NCLab (http://nclab.com) are designed for both K-12 students and adult learners who wish to pursue careers in STEM and advanced manufacturing. Learners develop soft skills that are in high demand by employers across all areas - logic, computational thinking, problem solving, perseverance, and ability to be creative and overcome failure. They also develop hard skills - math, geometry, 3D solid modeling, computer programming, and computing. By working challenging yet engaging practice problems, students learn by doing. The courses are web-based, completely self-paced (students learn at their own speed), and self-graded (instructors do not have to be subject matter experts). Learners who complete the courses are well prepared to move on to more complex programming languages, CAD programs, and college-level courses in advanced manufacturing. Regardless of grade level, learners improve their math practice skills. NCLab also offers a powerful cloud-based suite of advanced STEM computing and simulation tools.

## Who uses NCLab courses?

NCLab courses are taught in **schools** (grades 6 through 12), in **junior colleges,** and in **public libraries.** They are an excellent addition to maker spaces and camp programs. They are also suitable for **individual users** and **homeschoolers**.

## What courses are available for 2017-2018?

There are currently four courses in the catalog:



Karel Coding teaches logic, computational thinking, and fundamental procedural programming concepts (225 levels). Students type code (as opposed to dragging blocks). Extremely simple commands and syntax ensure that the student can focus on developing logic and algorithmic skills.

Turtle Coding teaches intermediate programming skills and introduces full syntax Python (90 levels). This is a Logo-type drawing program that creates geometric designs on the XY coordinate plane, which can be extruded and either printed on a 3D printer or made on a laser cutter.

Python Coding teaches advanced programming skills (200 levels). Like the other courses, students see the results of their code as part of a game. *Please note: Python is being revised and will be available June 2017.*

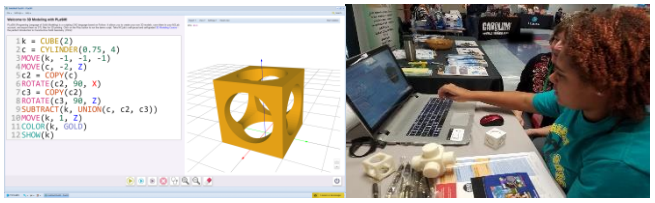
3D Modeling teaches constructive solid geometry (CSG) and develops 3D spatial reasoning skills (200 levels). The course puts strong emphasis on understanding 2D and 3D objects, translations, and rotations, and Boolean operations. Models can be exported as STL files and 3D-printed.

## What do these courses have in common?

NCLab courses are divided into units composed of five sections each. Each section is a concept arc composed of seven instructional levels. At the close of each level, a short quiz and practice problem check for understanding and provide essential feedback in the learning journey. The learning experience is easy to understand, manage, and assess, and successfully teaches concepts one manageable level at a time.

The course sequence is carefully designed to progress from simple to complex computer programming and 3D modeling. This sequential order creates a strong math foundation combined with higher level thinking. Both fundamental skills underlie the applied skills and abilities necessary to compete for good jobs in advanced manufacturing industries. This is what sets NCLab curriculum apart from other "learn-to-code" type opportunities.

NCLab's game-based learning is a powerful strategy that focuses on solving puzzles or games. Users apply what they have learned and get immediate feedback. As an incentive, learners earn points for each completed level, with bonuses for writing the program in fewer lines of code and solving without hints.



## What resources and tools are available to instructors?

Student management system: The "My Students" panel located on the instructor's virtual desktop provides classroom setup and management tools, and real-time progress monitoring.

Resources include lesson plans, instructional videos, standards maps, sequencing guides, student journals, textbooks, solution manuals, camp guides, and monthly newsletters are provided as linked documents or PDF downloads. These can be used to prepare students for a Section or Unit, discuss applications, build projects, and create off-line learning activities.

Training: NCLab provides both introductory and advanced, in-depth trainings for teachers and librarians.

Support: Our educational team consists of seasoned educators who have used NCLab in their classrooms. Support is available through email, phone, and online meetings.

## What courses are planned for the future?

NCLab will keep developing novel game-based courses related to advanced manufacturing technologies, including

- applied math and computing subjects, programming languages, control systems,
- CNC machining, robotics, hardware design, microprocessors, electrical circuits, and more.

## Pricing

All courses are available as one-year, renewable subscriptions for individual courses or courses bundles. Courses may be purchased for single users, classrooms, and school or library sites. Site licenses offer substantial discounts per user.

**Free PD License:** We encourage teachers, administrators, and librarians to sign up at http://nclab.com/teachers or http://nclab.com/librarians for a free, personal professional development license. This is an opportunity to improve their own STEM, coding, and modeling skills, and evaluate the courses for their classes, camps, clubs, and programs.

Please contact NCLab (office@nclab.com) for current pricing and other questions.

## Instructional Standards

NCLab courses are correlated with Common Core Math and ELA Standards, Next Generation Science Standards (NGSS), Educational Technology Standards (ISTE), Computer Science Standards (CSForAll), as well as Career and Technology Standards in California and Nevada, where applicable.

## Who is NCLab?

NCLab was founded in 2010 by Dr. Pavel Solin to provide 21st century computing tools to everyone. Our educators and programmers build courses and applications in collaboration with K-12 schools, colleges, libraries, state and industry partners. NCLab courses have been adopted by the Department of Education in Nevada as part of the Nevada Ready 21 program, and by the Nevada State Library Development Office. NCLab is used by schools and libraries in other U.S. states and other countries.

Contact us: Please visit nclab.com to learn more. Call 800-666-2024 or email office@nclab.com.