

# Chapter I

## Introduction

These lecture notes are exclusively for the use of students in Prof. MacLennan's *Unconventional Computations* course. ©2012, B. J. MacLennan, EECS, University of Tennessee, Knoxville. Version of August 24, 2012.

These lecture notes are exactly that: notes for my lectures. Don't expect a polished text, and you won't be disappointed!

### A Course mechanics

This is the first time this course has been taught, so *everything is subject to change*.

#### A.1 Contact information

This information can be found on the course website, [web.eece.utk.edu/~mclennan/Classes/494-UC](http://web.eece.utk.edu/~mclennan/Classes/494-UC) or [web.eece.utk.edu/~mclennan/Classes/594-UC](http://web.eece.utk.edu/~mclennan/Classes/594-UC).

#### A.2 Grading

- ¶1. **Homework:** There will be paper-and-pencil homework (math or unconventional computer programming) every week or two.
- ¶2. **Projects:** I am hoping to have at least one small project, probably using a quantum computer simulator to solve a problem or test a design.

- ¶3. **Presentation (for grad students):** Grad students will be expected to do a 20 min. in-class presentation in the last weeks of the class. This will be on a topic in unconventional computing that you can choose from a list (forthcoming) or propose yourself.
- ¶4. **Term paper:** All students will do a term paper, due during final exam week, on some topic in unconventional computation. Grad students can do their paper on the same topic as their presentation.

For the following topics, see the slides posted on the website.

## B Post-Moore’s Law computing

## C Super-Turing vs. non-Turing

## D Sources

- MacLennan, B. “Transcending Turing Computability,” invited contribution, *Minds and Machines* 13 (1): 3–22, February 2003.
- MacLennan, B. “Natural Computation and Non-Turing Models of Computation,” *Theoretical Computer Science* 317, Issues 1–3 (June 2004), special issue on Super-Recursive Algorithms and Hypercomputation, ed. by M. Burgin and A. Klinger, pp. 115–145.
- MacLennan, B. “Aspects of Embodied Computation: Toward a Reunification of the Physical and the Formal,” UT EECS Dept. TR UT-CS-08-610, March 6, 2008, revised Aug. 6, 2008.
- MacLennan, B. “Super-Turing or Non-Turing? Extending the Concept of Computation,” *The International Journal of Unconventional Computing* 5, 34 (2009), Special Issue on Future Trends in Hypercomputation, pp. 369–87.
- MacLennan, B. “Bodies — Both Informed and Transformed: Embodied Computation and Information Processing,” invited submission to *Information and Computation: Essays on Scientific and Philosophical Understanding of Foundations of Information and Computation*, ed.

by Gordana Dodig-Crnkovic and Mark Burgin, World Scientific Series in Information Studies, Vol. 2, Singapore: World Scientific Publishing, 2011, pp. 225–253.

MacLennan, B. “Embodied Computation: Applying the Physics of Computation to Artificial Morphogenesis,” *Parallel Processing Letters* 22, 3, 1240013 (2012). DOI: 10.1142/S0129626412400130