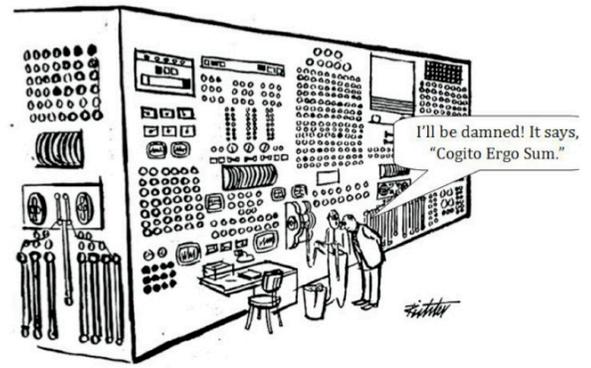# Syllabus

Through human history, people have used machine metaphors to understand the mind: clockworks in the 17th century, hydraulic and electro-magnetic systems in Freud's time, etc. Some might view the computer metaphor for mind in a similar light. But as Haugeland points out, the computer is different. Computers are taken to be a *special kind* of machine—to embody a unique, profound insights about the relation of mechanism to such distinctively human properties as *meaning*, *representation*, and *interpretation*. The contemporary prospect of building a thinking machine is thus serious in a way that it never was before.

I'll be damned! It says, "Cogito Ergo Sum."

Drawing by Richter; © 1958 "The New Yorker" Magazine, Inc.

The idea that the mind is computer—or at least a *kind* of computer—is known as the **computational theory of mind** (CTOM). It served as a foundational assumption underlying the emergence of Artificial Intelligence (AI) and cognitive science in the 1960s and 1970s.

In recent decades, the computational theory of mind has come under strenuous critique, but the broader idea that the mind is a *machine* is still widely believed. Moreover, several of the founding assumptions and insights of the CTOM project remain in place, even in the face of contemporary critiques. And AI proceeds apace.

In this course, we will look at prospects for mental machines by considering the nature of mind, the nature of machines (especially computers), the foundations of the computational theory of mind, and some more recently proposed architectural alternatives. We will focus on two broad themes: (i) *causal issues*, having to do with mechanism, modularity, architecture, embodiment, neuroscience, dynamics, networks, etc.; and (ii) *semantical issues*, including meaning, content, reference, semantics, language, representation, and information.

1 • Details

    A. Administrative Details

        1. *Course:*   Philosophy PHL342 · Minds and Machines · Fall term, Sept–Dec, 2015

            a. *Time:*   Tuesdays & Thursdays, 1:30 p.m. — 3:00 p.m.

            b. *Place:*   AH 100 (Alumni Hall, 121 St Joseph Street, St. Michael's Campus, Room 100)[1]

        2. *Instructor:*   Brian Cantwell Smith

            a. *E-mail:*   brian.cantwell.smith@utoronto.ca

            b. *Office:*   Room 633, Faculty of Information ("iSchool") Bissell Bldg, 140 St. George St.[2]

            c. *Office hours:* Thursday, 11:00 a.m.. – 12:00 p.m.

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[1] Note that this building is on the East side of Queen's Park.
[2] The Bissell Building is on the N side of Robarts, part of the same brutalist concrete complex.

3. *Teaching assistants*

    a. *Name*:   Damian Melamedoff   Robbie Matyasi
    b. *E-mail:*   damian.melamedoff@mail.utoronto.ca   robbie.matyasi@mail.utoronto.ca
    c. *Office:*   Jackman Humanities JHB419[3]   Jackman Humanities JHB419[3]
    d. *Office hours:* Noon − 1:00 p.m., Monday   2:00 − 3:00 p.m., Wednesday

4. *Resources:*   On the course Blackboard site

B. Texts: There are three forms of reading for this course:

1. **Texts:** There are two textbooks, of which sections will be assigned (only the assigned sections will technically be designated as "required," and thus considered fair game for inclusion on the final exam—though I encourage you to read both whole books).

    a. Walmsley, Joel, *Mind & Machine*, Palgrave Macmillan, 2012.[4]
    b. Haugeland, John, *Artificial Intelligence: The Very Idea*, Bradford Books / MIT Press, 1989.

2. **Slides:** Slides for each week's lectures will be placed on the Blackboard web site. Unless explicitly noted, *all material in these slides will be considered part of the course* (and thus a legitimate basis for questions on the exam), whether or not we have time to go over it in class.

    Notes that the slides are intended to serve as a scaffolding for, and reminder of, class discussion. They are not intended to be self-explanatory, nor will they contain all details for which you will be responsible. Note, too, that there will be considerable material on the slides that is not covered in the textbooks. So *come to class!*

3. **Readings:** In addition to the texts and lecture slides, a substantial collection of (~150) papers have been posted on the Blackboard site. Some of these are classic papers (such as Descartes' *Meditations* and Turing's 1950 "Computing Machinery and Intelligence"); others are contemporary commentary or discussion of relevant issues. As indicated in the class schedule reading list (below), some of these papers are "required," and will be assumed for purposes of the final exam, whether or not explicitly discussed in class. Others, marked "secondary," are suggested as additional reading on particular topics, which will be helpful as source materials for purposes of writing papers. But there are many other papers as well—feel free to explore this resource as you please.

II • Assignments

PHL342 has been identified as a "Writing for Research" (W4R) course by the Philosophy Dept. The structure of the papers, feedback, grading, etc., are thus set by the department, in line with the expectations of all such courses. (Content is of course specific to PHL342.)

A. *Assignments:* Two versions (draft and final) of two papers, plus a final exam, evaluated as follows:

1. Paper #1:   30% (15% draft version; 15% final version)
2. Paper #2:   40% (20% draft version; 20% final version)
3. Final exam: 30%

B. *Grading:* Papers will be graded based on criteria of clarity, originality, depth, insightfulness, relevance, scholarship, and expressive power.

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[3]The "Conversation Lab," 4th floor, across from the elevator, Jackman Humanities Bldg., NW corner of Bloor and St. George.
[4]Joel received his PhD in philosophy at the University of Toronto in 2005 under my supervision. While he was a graduate student he taught a version of this course; the title of his book is likely at last partly a reflection of the name of PHL342.

1. *Draft:* The draft version of each paper will be graded, annotated, and commented upon by the instructor and TAs. Comments on draft versions must be taken seriously in writing the final version.

2. *Final:* Grading of the final version of each paper will be based on a combination of 3 aspects, leading to a net score from 0–20.

   a. 10 points: The extent to which the student has addressed the issues raised in comments on the draft version (scored from 0–10 points);

   b. 5 points: The degree to which the final version is *improved* from the draft version; and

   c. 5 points: The final version's absolute quality.

   Keep in mind that the final version of a less than excellent but still acceptable draft version (say, one that receives a B) could receive a substantially *lower* grade than the draft, even if it is better overall, if it does not address (a) or (b), above.

C. *Dates:* Due dates for the draft and final versions of each paper are as follows:

	Paper #1		*Paper #2*	
1. Topics announced	Sep 29 (Tue)	⎤	Nov 5 (Thu)	⎤
2. Draft version due	Oct 15 (Thu)	16 days	Nov 19 (Thu)	14 days
3. Draft version returned	Oct 27 (Tue)	12 days	Dec 1 (Tue)	12 days
4. Final version due	Nov 5 (Thu)	9 days	Dec 8 (Tue)[5]	7 days
5. Final version returned	Nov 19 (Thu)	14 days	Later in Dec	⎦

Papers (both versions) must be submitted on the Blackboard course site, by 11:59 p.m. on the due date.[6]

D. *Anonymity:* Papers in PHL342 will be graded anonymously. When you submit your drafts and final versions to Blackboard, therefore, please do not put your name anywhere on the paper. Instead, use only your Student id.

E. *Submission requirements:* All assignments must be submitted according to the following requirements:

   1. File format: .docx (preferred), .doc, .pdf, .rtf, or .txt
   2. One-and-a-half or double spaced
   3. Minimum 1.5" (4 cm) margins on all 4 sides
   4. 12 point serif font (please: no heroics with fancy kerning)
   5. Student ID (not name!) in the upper right corner of every page (no credit given for unidentified pages)
   6. Citations in either
       a. [Chicago](#) "Notes & Bibliography" format (used by the American Philosophical Association [APA])[7]
       b. [Modern Language Association](#) (MLA)[8]

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[5]The last day of classes
[6]Blackboard is unable to record "12:00 p.m." as a time. If work is submitted later than 11:59 p.m., Blackboard will stamp it as having been submitted at 00:00 a.m. on the next day. Forewarned is forearmed!
[7]http://www.chicagomanualofstyle.org/tools_citationguide.html
[8]See either of:
   http://library.concordia.ca/help/howto/mla.php
   http://www.library.cornell.edu/resrch/citmanage/mla

7. Plagiarism: Please familiarize yourself with this [site][9] and U.of.T's [policy][10] about academic conduct.[11]

F. *Late assignments:* Students are expected to turn in all assignments by the specified deadlines. Late assignments will not be accepted without penalty unless:

1. Prior arrangements have been made with one of the two TAs for a specific later specific submission date; and

2. Written medical documentation is provided at the time the assignment is submitted.

(Damian and Robbie put in a tremendous amount of work reading and providing feedback. They respect your efforts. Please respect their time as well.)

   If papers are received late, without the foregoing conditions having been met:

1. 10% of the grade *that the paper would have received, had it not been late*, will be deducted per day that it is late. Example: if the draft version of paper #1 is submitted on Oct 19 (4 days after the due date of Oct. 15), and it would otherwise have received a grade of 78 (B+), then it will be given a grade of 47, which is $78 - 4 \cdot (78 \cdot 10\%)$) Note that 47 is a failing grade (FZ)—it is not even a D–. So it is of the *utmost importance that papers be submitted on time*.

3. No promise made about when late papers will be returned, but we will attempt to return late papers in no more than two weeks after they are received. If the late submission is a draft version, then the final version will considered to be due not before one week after the draft version has been returned.

G. *Writing:* Please familiarize yourself with the resources available at the U.of.T [writing support web site].[12] There are also a great many "guidelines for writing philosophy papers" available online, including (a random selection):

1. http://philosophy.fas.harvard.edu/files/phildept/files/brief_guide_to_writing_philosophy_paper.pdf
2. http://philosophy.fas.harvard.edu/files/phildept/files/guide_to_philosophical_writing.pdf
3. http://www.csus.edu/phil/req/writing.htm
4. http://www.sfu.ca/philosophy/resources/writing.html

H. *Writing Tips:* In addition to the above, I have made available (on the Blackboard site) an idiosyncratic set of "Writing Tips," to keep in mind while preparing your papers.

I. *Resources:* Some online resources that may be useful:

1. [Stanford Encyclopedia of Philosophy][13] ("From its inception, the SEP was designed so that each entry is maintained and kept up to date by an expert or group of experts in the field. All entries and substantive updates are refereed by the members of a distinguished Editorial Board before they are made public.")

2. [Routledge Encyclopedia of Philosophy][14] ("Comprehensive resource. Articles from all continents, all periods and cultures.")

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[9] http://www.writing.utoronto.ca/advice/using-sources/how-not-to-plagiarize
[10] http://www.governingcouncil.utoronto.ca/policies/behaveac.htm
[11] See also §III.C, below.
[12] http://www.writing.utoronto.ca/
[13] http://plato.stanford.edu/contents.html
[14] http://resource.library.utoronto.ca/a-z/more_info.cfm?id=5220 NB: this link currently seems to work only on Windows machines. We are investigating whether U.of.T access is available for Mac users. The syllabus will be updated when we learn more.

3. [Internet Encyclopedia of Philosophy](#)[15] ("Most of the articles in The Internet Encyclopedia of Philosophy are original contributions by specialized philosophers around the Internet.")

III • Practical Stuff

A. *Communication policy:* Except in *unusual circumstances, please do not email questions about the course to the instructor or TAs.* If you have a question, there is a very good chance that others in the class will have the same question—or at least will benefit from the answer. Please therefore *post all questions to Blackboard* (in the fora on the "Discussion Board") so that everyone in the class can benefit from your questions and from our answers. Questions posted to Blackboard will normally be answered within 24 hours (except on weekends and during reading week).

B. *Withdrawal:* Nov. 8, 2015 is the fall semester "drop date": the final date that a student may cancel their enrolment in PHL342 without academic penalty. Dropping the course after this date is not allowed.

C. *Academic integrity:* The essence of academic life revolves around respect not only for the ideas of others, but also their rights to those ideas and their promulgation. It is therefore essential that all of us engaged in the life of the mind take the utmost care that the ideas and expressions of ideas of other people always be appropriately handled, and, where necessary, cited. For writing assignments, when ideas or materials of others are used, *they must be cited*. Such attention to ideas and acknowledgment of their sources is central not only to academic life, but life in general.

    Use of material by others without proper citation—called **plagiarism**—is absolutely forbidden, and considered to be a very grave academic offence. Note that *neither the instructor nor either TA has any discretion whatsoever in dealing with cases of plagiarism. All cases must be reported.* This is a very strict U.of.T rule, to which we, as instructors, are bound. In particular, we are explicitly forbidden from "deciding charitably to let a confused or repentant student off," no matter how much we might otherwise be tempted.

    Please acquaint yourself with U.of.T's [Code of Behaviour on Academic Matters](#).[16]

    Note that citation is critical whether or not the cited passage or idea has been published. If you rely on an idea suggested by someone else (including another classmate, even at a coffee house or pub), make sure to cite the person and to give them full and appropriate credit (e.g.: Ebenezer Le Page, personal communication, Feb 30, 2015).

D. *Collaboration:* There is considerable wisdom in the maxim that you can only learn to "do" philosophy by engaging in philosophical discussion and debate. You are strongly lencouraged to talk with your classmates about your ideas, your plans for your paper, you hypotheses and claims, your writing intentions, etc.

    Needless to say, all writing should be your own, and you must give credit to others when credit is due. Do, however, get together for a coffee (or other libation); organize informal discussion groups; go over the readings with your friends, and so on. In particular: don't horde your ideas as if they were classified information. The space of philosophical views on issues of minds and machines is almost wholly explored. I guarantee that you are not going to discover a "secret," and that you are extraordinarily unlikely to come up with an argument that no one has thought of, or a criticism that has never before been lodged. Rather, the aim of the course is to let you season yourself in the topics, notions, ideas, theses, etc., that bear on these issues, and to develop your own complex,

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[15] http://www.iep.utm.edu/
[16] http://www.governingcouncil.utoronto.ca/policies/behaveac.htm

comprehensive, critical abilities.

Wisdom, especially philosophical wisdom, is not something that can be achieved in solitude.

E. *Students with a disability or diverse learning styles:* Students with diverse learning styles and needs are welcome in this course. If you have a disability or health consideration that may require accommodations, please approach your tutorial instructor and/or the <u>Accessibility Services Office</u>[17] as soon as possible. The Accessibility Services staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. The sooner you let them and us know about your needs, the more quickly we can assist you in achieving your learning goals in this course.

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[17]<u>http://www.accessibility.utoronto.ca/</u>

Class Schedule

Week/Date		Section	Topic	Required Readings	Paper #1	Paper #2
1	Sep 15	**I** — Intro	—no Class —			
	Sep 17		Introduction	AIVI: Intro & Ch. 1 M&M: Intro & Ch. 1		
2	Sep 22		Mark of the Mental			
	Sep 24		The Representational Theory of Mind			
3	Sep 29		Cartesian Legacy	Descartes: *Meditations* (esp. II & VI)	Topic announced	
	Oct 1	**II** — Classical Model	Formal Representation and Logic	AIVI: Ch. 2 M&M: Ch. 2 AIVI: Ch. 3 M&M: Ch. 3		
4	Oct 6		Digitality			
	Oct 8		GOFAI			
5	Oct 13		Reasoning		Draft due	
	Oct 15		Eliza, Parry, Racter			
6	Oct 20		Turing and the Turing Test	Turing: Computing Machinery & Intelligence		
	Oct 22		Chinese Room	Searle: Minds, Brains, & Programs		
7	Oct 27		Dreyfus & Critique	AIVI: Ch. 6; Dreyfus: From Micro-Worlds to Knowledge Rep:: AI at an Impasse"	Draft returned	
	Oct 29	**III** — Alterative Architectures	Mental Architecture			
8	Nov 3		Connectionism and Neural Networks	M&M: Ch. 4 & 5		
	Nov 5				Final due	Topic announced
9	Nov 10		**Fall Break**			
	Nov 12		Dynamical Systems	M&M: Ch. 6		
10	Nov 17				Final returned	
	Nov 19		Embodied Robotics	Brooks: Intelligence w/out Representation		Draft due
11	Nov 24					
	Nov 26		Extended Mind	Clark & Chalmers, Extended Mind		
12	Dec 1	**IV** — Issues	Implementation	M&M: Ch. 7		Draft returned
	Dec 3		Consciousness	Nagel: What is it Like to be a Bat?		
13	Dec 8		The Singularity	Chalmers: The Singularity		Final due

IV • Readings

This section identifies "required" and "secondary" readings for each week's classes.

Note: I am reluctant to make this distinction, since I believe it is important for each student to determine for themselves what they need to read in order to develop a sufficient mastery of a topic to follow what is discussed in class, and to write a good paper. Practicality requires some guidance, however; and it is reasonable to ask what will be assumed for the final exam. Works marked 'required' should be read *before* the classes for which they are assigned; in addition, questions on them will be deemed appropriate for the exam, whether or not we have talked about them explicitly in class. Works marked 'secondary' are suggested readings that you may want to explore—to follow up on interests, or for purposes of your paper.

Two textbooks are required; they are available at the U.of.T Book Store:[18]

1. M&M: Walmsley, Joel, *Mind & Machine*, Palgrave Macmillan, 2012.
2. AIVI: Haugeland, John, *Artificial Intelligence: The Very Idea*, Bradford Books / MIT Press, 1989.

All other readings are available on the Blackboard site.

September 17 & 22

I · Introduction

1. The Mark of the Mental and Representational Theory of Mind
   a. Required
      i. AIVI: Introduction and Chapter 1
      ii. M&M: Introduction and Chapter 1
   b. Secondary
      i. Block, Ned, "Psychologism and Behaviorism," *Philosophical Review*, vol. 90: 5–43, 1981
      ii. Dennett, Daniel C., "Artificial Intelligence as Philosophy and as Psychology," ch. 7 of *Brainstorms*. MIT Press. 1981.

September 29

3. The Cartesian Legacy
   a. Required
      i. Descartes, Rene, *Meditations*,[19] especially meditations II & VI.

October 2 – 13

II · The Classical Model

1. Formal Representation and Logic, Digitality, GOFAI (Good Old Fashioned Artificial Intelligence), and Reasoning
   b. Required

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[18]http://www.uoftbookstore.com, Koffler Student Centre, 214 College Street, Toronto, ON M5T 3A1; 416.640.7900.
[19]The Jonathan Bennett translation is available under "readings" on the Blackboard site; it is also available online at: http://www.earlymoderntexts.com/assets/pdfs/descartes1641.pdf
The John Veitch translation is available online at http://www.wright.edu/cola/descartes/

      i. AIVI: Chapter 2

      ii. M&M: Chapter 2

  c. Secondary

      i. Haugeland, John, "Semantic Engines: An Introduction to Mind Design," from John Haugeland, ed., *Mind Design* (1st edition), MIT Press, Cambridge, MA, 1981.

      ii. Newell, Allen & Simon, Herbert A., "Computer Science as Empirical Inquiry: Symbols and Search," *Communications of the ACM*, **19**:3, 113–126, 1976.

      iii. Clark, Andy, *Mindware: An Introduction to the Philosophy of Cognitive Science*, Oxford Univ Press, 2000.

      iv. Fodor, Jerry A., "Special Sciences (Or: The Disunity of Science as a Working Hypothesis)," *Synthese* **28**, 97–115, 1974.

      v. Friedland, Noah S, Allen, Paul G, Matthews, Gavin, and Witbrock, Michael, "Project Halo: Towards a Digital Aristotle," *AI Magazine;* ; 25: 4, 29–47, Winter 2004.

      vi. Smith, Brian Cantwell, "The Semantics of Clocks," in James H. Fetzer, ed., *Aspects of Artificial Intelligence,* The Netherlands: Kluwer Academic Publishers, pp. 3–31.

October 20

  4. Turing and the Turing Test

    a. Required

      i. M&M: Chapter 3

      ii. Turing, Alan M., "Computing Machinery & Intelligence," *Mind*, LIX. 433-460, 1950

    b. Secondary

      i. French, Robert M., "Subcognition and the Limits of the Turing Test," Mind, 99: 393, 53–65. 1990.

      ii. Shieber, Stuart M., The "Turing Test as Interactive Proof," *Noûs*, 41:4, 686–713. 2007.

      iii. Oppy, Graham and Dowe, David, "The Turing Test," *Stanford Encyclopedia of Philosophy*[20]

      iv. Shieber, Stuart M., "Lessons from a Restricted Turing Test," *Communications of the ACM*, **37**:6, 70–78, 1994.

October 22

  5. The Chinese Room

    a. Required

      i. Searle, John R., "Minds, Brains, and Programs" (without comments), *Behavioral and Brain Sciences*, **3**. 417–424, 1980.

    b. Secondary

      i. Comments on Searle, John R., "Minds, Brains, and Programs" (reference in I·B·1·b, above).

October 27

  6. Dreyfus and Critique

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[20]Available online at: http://plato.stanford.edu/entries/turing-test/

a. Required
   i. AIVI: Chapter 6
   ii. Dreyfus, Hubert L., "From Micro-Worlds to Knowledge Representation: AI at an Impasse," Ch. 6 of John Haugeland, ed., Mind Design, MIT Press, 1979.
b. Secondary
   i. Dreyfus, Hubert L., *What Computers Can't Do* (Parts I & II), MIT Press, 1972.
   ii. Smith, Brian Cantwell, "The Owl and the Electric Encyclopedia," *Artificial Intelligence*, **47**, 251–288.
   iii. Curtis, Jon, Gavin Matthews, and Baxter, David, "On the Effective Use of CYC in a Question Answering System," in *Proceedings of the IJCAI Workshop on Knowledge and Reasoning for Answering Questions*, 61–70, 2005.
   iv. Dreyfus, Hubert L., "Why Heideggerian AI Failed and how Fixing it would Require making it more Heideggerian," *Artificial Intelligence,* Special Review Issue, **171**: 18, 1137-1160, 2007; and *Philosophical Psychology* **20**: 2, 247–268, 2007.
   v. Lucas, J. R., "Minds, Machines and Gödel," *Philosophy*, **36**: 137, pp. 112-127, 1961.

October 29

III · Alternative Architectures

1. Mental Architecture

November 3 & 5

2. Connectionism & Neural Networks
   a. Required
      i. M&M: Chapters 4 & 5.
   b. Secondary
      i. Rumelhart, David E., "The Architecture of Mind: A Connectionist Approach," Ch. 8 of John Haugeland, ed., *Mind Design II: Philosophy, Psychology, and Artificial Intelligence*, MIT Press, 1997.
      ii. Fodor, Jerry A. & Pylyshyn, Zenon W., "Connectionism and Cognitive Architecture: A Critical Analysis," *Cognition*, 28: 1-2, 3–71, 1988.
      iii. Churchland, Paul & Churchland, Patricia, "Could a Machine Think?" Scientific American, Jan. 1990, 32–27.
      iv. Chalmers, David A., "Connectionism and compositionality: Why Fodor and Pylyshyn were wrong," *Philosophical Psychology*, Vol. 6, No. 3. pp. 305-319, 1993.

November 10 — Fall Break

November 12 & 17

3. Dynamical Systems
   a. Required
      i. M&M: Chapter 6
   b. Secondary

     i. van Gelder, Tim, "Dynamics & Cognition," ch. 16 of John Haugeland, ed., *Mind Design II: Philosophy, Psychology, and Artificial Intelligence*, MIT Press, 1997.

     ii. van Gelder, Tim & Port, Robert, "It's About Time: An Overview of The Dynamical Approach to Cognition" Introduction to van Gelder, Tim & Port, Robert, *Mind as Motion*, MIT Press, 1995.

     iii. Mitchell, Melanie, "A Complex-Systems Perspective on the "Computation vs. Dynamics" Debate in Cognitive Science," in M. A. Gernsbacher and S. J. Derry, eds., *Proceedings of the 20th Annual Conference of the Cognitive Science Society* Cogsci98, 710-715, 1998.

     iv. van Gelder, Tim, "The Dynamical Hypothesis in Cognitive Science," *Behavioral and Brain Sciences*, **21**, 615–665, 1997.

     v. van Gelder, Tim, "Disentangling Dynamics, Computation, and Cognition," *Behavioral and Brain Sciences,* **21**, 654-661, 1998.

November 19 & 24

    4. Embodied Robotics
      a. Required
        i. Brooks, Rodney A., "Intelligence without Representation," *Artificial Intelligence* **47**, 139–159, 1991.
      b. Secondary
        i. Haugeland, John, "Mind Embodied & Embedded," ch. 9 of John Haugeland, ed., *Mind Design*.
        ii. Brooks, Rodney A., "Intelligence without Reason," *Proceedings of 12th Int. Joint Conf. on Artificial Intelligence*, Sydney, Australia, pp. 569–595, 1991.

November 26

    5. Extended Mind
      a. Required
        i. Clark, Andy & Chalmers, David, "The Extended Mind," *Analysis* **58**: 1, 7–19, 1998.

December 1

IV · Open Issues

    1. Implementation

December 3

    2. Consciousness
      a. Required
        i. Nagel, Thomas, "What is it Like to be a Bat?", *The Philosophical Review*, **83**: 4 (Oct., 1974), 435-450.
      b. Secondary
        i. Block. Ned, "On a Confusion about a Function of Consciousness," *Behavioral and Brain Sciences* **18** (2): 227-287. Also in *The Nature of Consciousness*, edited by Block. N., Flanagan. O., and Guzeldere. G., MIT Press, 1997

      ii. Jackson, Frank, "What Mary Didn't Know," *The Journal of Philosophy*, **83**: 5 (May, 1986), 291–295.

December 8

3. The Singularity
   a. Required
      i. M&M: Chapter 7
      ii. Chalmers, David, "The Singularity: A Philosophical Analysis," *Journal of Consciousness Studies* **17**:7-65, 2010.

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