BMI 101 Introduction to Conscious Learning

2026

http://www.brain-mind-institute.org/bmi-101.html

Brain-Mind Institute (BMI) 1 Credit

This course provides an overview about how consciousness arises from a biological brain and how the brain gradually becomes increasingly conscious through autonomous learning. The brain solves the local minima problem that all other machine learning methods (such as AlexNet, ChatGPT, and DeepSeak, other than our line) all suffer from, as demonstrated in the invalid protocol of Post-Selection misconduct (also known as P-Hacking).

Examples of fundamental discipline questions to be discussed:

Biology: Why must the brain automatically form its area patterns (i.e., brain patterning) through experience?

Neuroscience: How is consciousness in the closed-skull free from a humonculus?

Psychology: What kind of learning models has been proposed in psychology?

Computer Science: Why is the automata theory (e.g., Universal Turing Machine) necessary for us to understand conscious learning?

Electrical Engineering: Why can the brain solve the highly complex nonlinear problem of consciousness?

Mathematics: Why is maximum likelihood useful for us to understand how the brain avoids the local minima problem?

Physics: How does consciousness arise from physics?

Prerequisites: A highly motivated attitude demonstrated by a high GPA in transcripts of a high school, undergraduate, or graduate program.

Instructor: Juyang (John) Weng

Course web: `http://www.brain-mind-institute.org/bmi-101.html`

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Text: J. Weng, *Conscious Learning*, manuscripts to be published by WSPC. The instructor will hand out readings extracted from the manuscripts.

Homework: The due time for each homework is provided in Table 1. You should complete the homework before the following lecture so that you can understand the following lecture. Homework will be collected via email, but only some problems in each homework will be graded. However, homework is required for understanding the course material and is critical for exams.

Table 1: Homework and Exams

Date	Lecturest	Homework due
Monday, July 13	Lecture 1: Biology of conscious learning	8 pm
Tuesday, July 14	Lecture 2: Psychology of conscious learning	8 pm
Wednesday July 15	Lecture 3: Neuroscience of conscious learning	8 pm
Thursday July 16	Lecture 4: Electrical engineering of conscious learning	8 pm
Friday July 17	Lecture 5: Computer science of conscious learning	8 pm
Saturday July 18	Exam	10am - noon
Sunday July 19	Tour	

Quizzes: Quizzes are short multiple-choice problems to be completed before each lecture.

Exam: One exam will be conducted to review the concepts covered in the course. Reading handouts and doing homework are important for doing well in the exam.

Grading: Pass: the total score is 60% or above. Those who successfully pass will receive a BMI 101 Certificate.

Schedule for Dues

See Table 1, where all the items are in the U.S. Eastern Daylight Time (EDT).

Send your completed homework before the due time to the lecturer with email Subject: BMI101 Homework N by Your-First-Name Your-Last-Name.

Do not use other email headers because the lecturer receives many emails every day.

Supplemental readings that provide background knowledge

1. B. Baars, Global workspace theory of consciousness: toward a cognitive neuroscience of human experience, chapter 4 of *Progress in Brain Research* vol. 150. Elsevier, New York, NY, 2005.

2. M. F. Bear, B. W. Connors, and M. A. Paradiso, *Neuroscience: Exploring the Brain*, 3rd edition, Lippincott Williams & Wilkins, Baltimoore, 2007.

3. J. B. Reece, L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky, and R. B. Jackson, *Campbell Biology*, 9th edition, Benjamin Cummings Publishers, San Francisco, 2011.

4. P. S. Churchland and T. J. Sejnowsky, *The Computational Brain*, The MIT Press, Cambridge, MA, 1996.

5. M. Cole, S. R. Cole and C. Lightfoot *The Development of Children,* Freeman, New York, 2004.

6. P. Dayan, L. F. Abbott, *Theoretical Neuroscience*, Taylor & Francis, New York, NY, 2001.

7. M. Domjan, *The Principles of Learning and Behavior: Active learning edition*, Thomson/Wadsworth, Belmont, CA, 2006

8. J. L. Elman and E. A. Bates and M. H. Johnson and A. Karmiloff-Smith and D. Parisi and K. Plunkett, *Rethinking Innateness: A Connectionist Perspective on Development*, MIT Press, Cambridge, MA, 1996.

9. C. Koch, What is consciousness? *Scientific American*, vol. 318, no. 6, pp. 60-64, June, 2018.

10. J. Martin, *Introduction to Languages and the Theory of Computation*, 3rd edition, McGraw-Hill, New York, 2007.

11. E. R. Kandel and J. H. Schwartz and T. M. Jessell, *Principles of Neural Science*, 4th edition, McGraw-Hill, New York, NY, 2000.

12. R. Penrose, *Shadows of the Mind: A Search for the Missing Science of Consciousness*, Oxford University Press, Oxford, 1994.

13. W. K. Purves, D. Sadava, G. H. Orians, and H. C. Heller, *Life: The Science of Biology,* 7th edition, Sinauer, Sunderland, MA, 2004.

14. K. Richardson, *Models of Cognitive Development*, Psychology Press, East Sussex, UK, 1998.

15. T. R. Shultz, *Computational Developmental Psychology*, MIT Press, Cambridge, MA, 2003.

16. J. Weng, *Natural and Artificial Intelligence: Introduction to Computational Brain-Mind*, 2nd edition, BMI Press, Okemos, Michigan, 2019. Available from Amazon and the author.