

Gödel, Escher, Bach

Fall 2011, Weekday Program, 3 or 5 credits

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We will read Douglas Hofstadter's book *Gödel, Escher, Bach* and related works. This book covers a wide range of topics in mathematics, including connections to art and music. It leads to questions of how the mind (and consciousness) works, the possibilities of artificial intelligence, and the role of self-reference and formal rules in finding meaning.

The expectations for this course are as follows:

- *Participation (50%)*: It is essential that you come to class with an open mind and willing to speak, listen, and respect the viewpoints of others. In order to participate fully, you need to come to class on time every day. Every missed class, late arrival, early departure, and break counts against your participation grade. Everyone is expected to attend on Mondays and Wednesdays; if you're enrolled for five credits, you must also attend on Thursdays. Three-credit students may miss no more than three classes, five-credit students no more than four. If you exceed the absence limit, you will not pass the course, except in unusual circumstances. I'll warn you after two absences.
- *Homework (15%)*: I'll assign problems for you to solve and turn in on specified dates throughout the semester. Some (not all!) of these are listed on the syllabus. You may discuss the problems with your classmates, but must write your solutions separately. All problems are due in hard copy at the beginning of class. If you are unable to turn in an assignment on time, speak with me in advance. Homework will be graded on a Pass(+)/Rewrite basis: if your homework is not satisfactory, you must revise until it is. Due dates for required revisions will be stated on your returned homework. You may also revise voluntarily, provided you speak with me within one week of receiving your returned homework to arrange a new due date. **No work will be accepted after 4 pm on Friday, 2 December.**
- *Class leadership (10%)*: Four classes have been set aside for student leadership. On each of these days, a few of you will be in charge of class. You may choose to work together or divide the time between you, and will select one or more discussion topics. You can decide to go over a previous reading that you think deserves more attention or bring in something new. Your grade will be based on how well you lead the discussion.
- *Project (25%)*: You are expected to do a project that is somehow connected to *Gödel, Escher, Bach*. This project can take many forms — you have all the freedom of a Semester Project, except for the required link. Make sure the link is clear. If you choose to do something other than an essay, include an explanation of what you did and why and how you did it. This is also like a semester project, except that this explanation will be a significant factor in your grade, so make sure it's clear and complete. You are expected to present your project to the class on one of the last two days.

Calendar

Date	Reading
Aug. 25	Hofstadter, “Who Shoves Whom Around Inside the Careenium?”
M29	GEB: Introduction (p. 3–32) Bach, <i>Musical Offering</i> , “Three-Part Ricercar” (tracks 1–2)
W31	GEB: Chapters 1 & 2 and the preceding dialogs (p. 29–60) Spivak, Definition of isomorphism
Sept. 1	<i>Lewis Carroll’s Games & Puzzles</i> Pick your favorites for us to play with in class!
W7	GEB: <i>Sonata...</i> & Chapter 3 (p. 61–74)
R8	Roberts, <i>Thinking Recursively with Java</i> , Chapters 1 & 3
M12	GEB: <i>Contracrostipunctus</i> & Chapter 4 (p. 75–102) Bach, <i>The Art of Fugue</i> , “Contrapunctus 19” (online)
W14	GEB: <i>Little Harmonic Labyrinth</i> & Chapter 5 (p. 103–152)
R15	Roberts, <i>Thinking Recursively with Java</i> , Chapters 5 & 8, §9.2
M19	GEB: <i>Canon...</i> & Chapter 6 (p. 153–176) Homework: Egyptian Hieroglyphs
W21	GEB: <i>Chromatic...</i> & Chapter 7 (p. 177–198)
R22	Rawlinson, “A second solution to the cuneiform script” Matouš, “Hrozný deciphers the Hittite cuneiform” Schaeffer, “The discovery of Ugarit” Snyder, Barzilay, & Knight, “A Statistical Model...”
M26	GEB: <i>Crab Canon</i> & Chapter 8 (p. 199–230) Bach, <i>Musical Offering</i> , “Crab Canon” (track 4)
W28	GEB: <i>A Mu Offering</i> & Chapter 9 (p. 231–274) Review <i>Gödel’s Proof</i> §VIIa (p. 68–80)
R29	Nagel & Newman, <i>Gödel’s Proof</i> , p. 114 Roberts, <i>Thinking Recursively with Java</i> , §2.1 Try to solve problems 1, 3, & 6 on pages 27–29
Oct. 3	GEB: <i>Prelude...</i> & Chapter 10 (p. 275–310)
W5	GEB: <i>...Ant Fugue</i> & Chapter 11 (p. 311–365)
M10	Student-led class
W12	GEB: <i>English...</i> & Chapter 12 (p. 366–390) Homework: Constrained writing
R13	Student-led class
M17	GEB: <i>Aria...</i> & Chapter 13, part 1 (p. 391–416)
W19	GEB: Chapter 13, part 2 (p. 417–430)
R20	Student-led class
M24	GEB: <i>Air...</i> & Chapter 14 (p. 431–461) Review: <i>Gödel’s Proof</i> §VIIb–c (p. 80–109)
W26	GEB: <i>Birthday...</i> & Chapter 15 (p. 461–479)
R27	Braitenberg, <i>Vehicles</i> , p. 1–25, 95–99, 102–113

M31	GEB: <i>Edifying Thoughts...</i> & Chapter 16, part 1 (p. 480–513)
Nov. 2	GEB: Chapter 16, part 2 (p. 514–548)
R3	Braitenberg, <i>Vehicles</i> , p. 26–54, 100–102, 113–114, 120–133, 140–143
M7	GEB: <i>The Magnificrab...</i> & Chapter 17 (p. 549–585)
W9	GEB: <i>SHRDLU...</i> & Chapter 18 (p. 586–633) Homework: Eliza
R10	Braitenberg, <i>Vehicles</i> , p. 56–83, 114–120, 133–140, 143–144
M14	Student-led class
W16	GEB: <i>Contrafactus</i> & Chapter 19 (p. 633–680)
R17	Turing, “Computing machinery and intelligence” Barsalou, Breazeal, & Smith, “Cognition as Coordinated Non-Cognition”
M21	GEB: <i>Sloth Canon</i> & Chapter 20 (p. 681–719) Bach, <i>Musical Offering</i> , “Canon by Augmentation” (track 7)
M28	GEB: <i>Six-Part Ricercar</i> (p. 720–743) Bach, <i>Musical Offering</i> , “Six-Part Ricercar” (track 20)
W30	Project presentations
Dec. 1	Project presentations
F2	Project due at 4 pm

Booklist

Everyone	5-Credit Students Only
Hofstadter, <i>Gödel, Escher, Bach</i>	<i>Lewis Carroll’s Games & Puzzles</i>
Bach, <i>Musical Offering</i> (CD)	Roberts, <i>Thinking Recursively with Java</i>
Spivak, Definition of isomorphism	Braitenberg, <i>Vehicles</i>
Nagel & Newman, <i>Gödel’s Proof</i>	Course Pack