

Math and Physics Fellowship Guidelines

Math and Physics Fellowship Responsibilities

A. During all four years:

1. Maintain a 3.0 GPA each semester.
2. Attend Math and Physics Fellowship meetings and sponsored events.
3. Attend no less than 2 math- or physics-related seminars each semester.
4. Maintain a log sheet recording fellowship hours.
5. Complete 120-140 Fellowship hours per year.

B. Additional requirements during the first year:

1. Meet twice per month with the fellowship director.

C. Additional requirements during the second year:

1. Complete the required 45-minute Respect and Esteem Training. This time can be included on your log sheet. A copy of the completion certificate must be printed and delivered to the Math, Physics, & Statistics office or Fellowship Director.
 - [Online Respect and Esteem Training](#)
 - This training must be completed every 2 years when directed.
2. Serve 4 hours per week as a Tutor in the Math and Physics Center **both** Fall and Spring semesters.
3. Book review and discussion (see book list for options)

D. Additional requirements during the third and fourth year:

1. Under the direction of your mentor, work 4 hours per week in research or in the Math and Physics Center.

	Year 1	Year 2	Year 3	Year 4
Fall	Book <u>The Soul of Science - Christian Faith and Natural Philosophy</u>	Math Center and Book – selections from <u>Mathematics: Through the Eyes of Faith</u>	Math Center or Research <u>Mathematics in a Post-modern Age</u>	Math Center or Research
Spring	Books <u>For the Glory of God and Not a Chance</u>	Math Center and Book – selections from <u>Mathematics: Through the Eyes of Faith</u>	Math Center or Research <u>Mathematics in a Post-modern Age</u>	Senior Capstone Project Math Center or Research

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Fulfilling hourly requirements for the Math and Physics Fellowship.

Note: In the *Research Option* and if pre-approved by the Director of the Math and Physics Fellowship program and the faculty mentor, hours may be fulfilled during the summer months. All hours must be completed before the start of the new academic year.

The following activities are appropriate for meeting the hourly requirements:

First Year:

- Assigned reading and reflection papers
- Math and Physics Fellowship meetings
- Approved field trips (get forms/assignments and approval before going)
- Other activities pre-approved by the Fellowship Director
- Final presentation to faculty and students on Mathematics and the Christian worldview

Years Two through Four:

- Tutoring in the Math and Physics Center or Research Assistant
- Time with mentor
- Reading pre-approved journal articles, books, and preparing presentations
- Literature/Web searches for research
- Math and Physics Fellowship meetings
- Other activities pre-approved by your faculty mentor and the Fellowship Director

Procedure for awarding the Math and Physics Fellowship Scholarship

Scholarship awards (\$3,000 per year) will be credited each year to the recipient's APU student account in the form of financial aid, half being awarded in the fall semester and the other half in spring.

Scholarship funds are awarded for no more than 4 years and cannot be received for semesters that the student is off-campus (i.e., Oxford, South Africa, Study Away, etc.).

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Continuance in the Math and Physics Fellowship Program

A. Requirements:

1. Remain a major in the Department of Mathematics and Physics.
2. Maintain a 3.0 GPA.
3. Fulfill all Math and Physics Fellowship responsibilities. Students may lose the scholarship for the semester if deadlines and responsibilities are not met.
4. Receive satisfactory evaluation by faculty mentor and Fellowship Director at end of each year.

B. Penalties:

Failure to fulfill the above requirements will result in the following penalties:

- Item 1. Immediate loss of scholarship
- Item 2. After one semester: Probation - The student may remain in the program if significant improvement is seen in the following semester.

After two such semesters: loss of scholarship. The student may request to rejoin the program if significant improvement is seen in the following semester. However, this is subject to availability.

- Items 3 & 4. After one such semester: 1) loss of scholarship funds and 2) immediate dismissal or probation.

After two such semesters: loss of scholarship

C. Recourse

Any Math and Physics Fellowship recipient placed on probation or removed from the Math and Physics Fellowship program who believes that they have been treated unfairly should first talk to their faculty mentor. If that discussion proves unsatisfactory, they may arrange a meeting with the Fellowship Director. If, after meeting with the Director, they believe the penalty is still unjust they may request to present their case to the Math and Physics Fellowship Program Committee. The decision of the Committee is final.

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APPENDIX A

Math and Physics Fellowship First Year Requirement APPROVED READING LIST

FRESHMEN - You must submit one book review on a book selected from the approved reading list. The Fall semester book to be read on your own, over the summer, is Livio's Is God a Mathematician? The **book review** assignment needs to be completed by the first week of the Fall semester. See Appendix B.

In addition, if approved by your mentor, you may read any of the following to count towards your hours. Please submit a **book review** with it. See Appendix B.

Approved Books:

- Cohen, Daniel. (2007) *Equations from God: Pure Mathematics and Victorian Faith*. Baltimore: Johns Hopkins Univ. Press. A study of the secularization of mathematics as it took place in nineteenth-century England.
- Katz, Victor J. (1993) *A History of Mathematics: An Introduction*. New York: HarperCollins. A widely used textbook on the history of mathematics.
- Koetsier, T., and L. Bergmanns, eds. (2005) *Mathematics and the Divine: A Historical Study*. Amsterdam: Elsevier. A collection of scholarly essays covering the relationship between mathematics and religious belief from ancient to modern times.
- Rucker, Rudy. (2004) *Infinity and the Mind*. Princeton, NJ: Princeton Univ. Press. A readable and entertaining introduction to the different infinities and the people who have historically been associated with them.
- Abbott, Edwin A. (1884) *Flatland: A Romance of Many Dimensions*. Seelcy & Co., London. Available in several subsequent editions. A classic description of reality in a two-dimensional world.
- Neuhouser, David L. (2001) *Open to Reason*. Upland, IN: Taylor Univ. Press. An exploration of the interplay among the roles of reason, mathematics, and Christian belief.
- Bartholomew, David. (2008) *God, Chance and Purpose: Can God Have It Both Ways?* Cambridge: Cambridge Univ. Press. A clear and detailed articulation of theistic nondeterminism.
- Dunham, William. (1990) *Journey Through Genius: The Great Theorems of Mathematics*. New York: Wiley. A history of great mathematics traced through significant mathematical theorems and their proofs.
- Polya, George. (1945) *How to Solve It: A New Aspect of Mathematical Method*. Princeton, NJ: Princeton Univ. Press. A classical book on problem solving by a remarkably lucid and highly regarded mathematical writer. It has been republished since 1945 and has sold over a million copies.

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- Hardy, G.H. (1940) *A Mathematician's Apology*. Cambridge: Cambridge Univ. Press. Hardy's essay, a classic defense of pursuing mathematics for its own sake, has the beauty of mathematics as one of its primary themes. It also provides insight for the layman into the mind of a working mathematician.
- Huntley, H.E. (1970) *The Divine Proportion: A Study in Mathematical Beauty*. New York: Dover.
- Livio, Mario (2003) *The Golden Ratio: The Study of Phi, the World's Most Astonishing Number*. New York: Random House.
- Brown, James Robert (2008) *Philosophy of Mathematics*. 2nd ed. New York: Routledge. A basic book on the philosophy of mathematics; takes a decidedly realist (Platonist) position.
- Clouser, Roy A. (2005) *The Myth of Religious Neutrality*. Rev. ed. Notre Dame, IN: Univ. of Notre Dame Press. Clouser argues that all disciplines employ underlying presuppositions that are religious in nature. This is the most widely read English-language resource for understanding Dooyeweerd's philosophy. See especially chapters 1, 4, 10, and 11.
- Hardy, G.H. (1967) *A Mathematician's Apology*. London: Cambridge Univ. Press. A classic defense of the mathematical enterprise by one of the greatest mathematicians of the twentieth century.
- Stewart, Ian. (2005) *Letters to a Young Mathematician*. New York: Basic Books. A modern version of Hardy's *A Mathematician's Apology*, Stewart's book is a series of letters addressed to a fictitious student (but who is a compilation of all his students) as she progresses from high school to college to professorship in mathematics.
- Bartley, W.W. (1977) *Lewis Carroll's Symbolic Logic*
- Howell, R. (2001) *Mathematics in a Post-modern Age*
- Livio (2009) *Is God a Mathematician?*
- Behe, M. (1998) *Darwin's Black Box*
- Van Til (1990) *Portraits of Creation*
- Moreland, J.P. (1999) *Creation and Evolution*
- Schaefer, H.F. III (2003) *Science and Christianity: Conflict or Coherence?*
- Dembski W.A. (2004) *The Design Revolution: Answering the Toughest Questions About Intelligent Design*

Other books/articles pre-approved by the Fellowship Director:

- Grattan-Guinness, Ivor. (2000) "Christianity and Mathematics: Kinds of Link, and the Rare Occurrences After 1750." *Physis: Rivista Internazionale di Storia della Scienza*, Nuova serie 37, no. 2: 288-322. A broad historical study of the links between mathematics and religion with special emphasis on Christianity.

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- Hilbert, David. (1930) "Königsberg Address." Available in English translation at <http://math.ucsd.edu/~williams/motiv/hilbert.html>. A famous speech in which Hilbert laid out his vision for a formal, secularized mathematics.
- Dauben, J.W. (2004) "Georg Cantor and the Battle for Transfinite Set Theory." Journal of the Association of Christians in the Mathematical Sciences. Similar to Dauben's book, but briefer.
- Tapp, Christian. (February 2011) "Infinity in Mathematics and Theology." Theology and Science 9, no. 1, 91-100. A scholarly study contrasting how the word *infinity* is used in the two disciplines.
- Lewis, Albert C. (February 2011) "The Divine Truth of Mathematics and the Origins of Linear Algebra." Theology and Science 9, no. 1, 109-120. An exploration of the origins of Grassman's thinking about linear algebra and the role that theology played in that discovery.
- Byl, John. (October 2003) "Indeterminacy, Divine Action and Human Freedom." Science and Christian Belief 15, no. 2: 100-115. A clear and detailed articulation of theistic determinism.
- Hamming, R.W. (February 1980) "The Unreasonable Effectiveness of Mathematics." American Mathematical Monthly 87, no. 2: 81-90. The well-known computer scientist responds to the 1960 essay, cited below, by Eugene Wigner.
- Wigner, Eugene. (February 1960) "The Unreasonable Effectiveness of Mathematics in the Natural Sciences." Communications in Pure and Applied Mathematics 13, no. 1: 1-14. Available online at, www.dartmouth.edu/~matc/MathDrama/reading/Wigner.html.
- Jongsma, Calvin. (October 2006) "Mathematics, Always Important, Never Enough: A Christian Perspective on Mathematics and Mathematics Education." Journal of the Association of Christians in the Mathematical Sciences. In the context of a letter to his granddaughter, Jongsma presents a view similar to the empiricist perspective on mathematics.
- Zwier, P. (1983) A comparative study of Christian Mathematical Realism and its Humanistic alternatives
- Kappelman, T.C. (1998) The Breakdown of Religious Knowledge
- Kerby, A. (2010) Worldviews through history (Probe website)
- Poythress, V. (1974) Creation and Mathematics: What does God have to do with numbers? (The Journal of Christian Reconstruction) Vol. 1, Issue 1, p.128-140
- Solomon, J. (1994) Worldviews (Probe website)
- Nickel, J. (2003) Why James Nickel wrote "Mathematics: Is God Silent?"
- Zeiger, H. (2007) A Meaningful World (Probe website)
- Wigner, E. (1960) The unreasonable effectiveness of mathematics in the natural sciences.
- Lauerell, W.D. (1994) Mathematics: Is God Silent? A review essay (Christian Scholars Review – journal article)

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APPENDIX B - Instructions for a Book Review

Introduction: The following is a **required** assignment for the **first year** Math and Physics Fellowship. The purpose of this exercise is to give you an overview of the development of mathematics. While the author, Livio, is not a Christian, he still begs the question “Is God a Mathematician?” and does a good job of tracing the development of mathematics through history.

In addition, I have included steps on how to “pre-read” a book. This is a valuable exercise for your future academic work. It will give you a good idea of the overall theme of a book and the author’s intentions. Feel free to walk through the steps before you sit down and read the entire book. As you enter the University, this is a valuable exercise in training you to be critical thinkers and scholars.

Book Review requirements:

Please read the book completely and write a 5-7 page typed document for the book, Is God a Mathematician?, using the following format to complete the paper.

- Heading:** Include your name and the exact bibliographic citation (APA format) for the book you are reviewing in the header. Report the number of pages read.
- Title:** Rename the book. Be creative. Consider the main idea of the reading and suggest a new title for the work.
- Section 1:** Summarize the content and message of the book in a single paragraph.
- Section 2:** Paraphrase each chapter in a paragraph or two with your favorite ideas, stories or illustrations from the book.
- Section 3:** Describe the two most interesting notions about mathematics gleaned from the book. For example, you may want to discuss the significance of Pascal’s triangle, how prime numbers got their name, or explore how the Fibonacci numbers model growth in nature.

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How to Pre-Read a Book

Please pre-read the book. Pre-reading consists of the following:

1. Consider the title and sub-title. In a sentence or two, what do they suggest about the content of the book? Its focus? Its evaluative point of view?
2. Examine the table of contents.
3. Read the back cover, the forward, preface and/or introduction. What specific statements do these sections make regarding the following items:
 - a. the author's purpose,
 - b. the theme of the book,
 - c. the main subject matter,
 - d. any time period, geographical, or ideological boundaries in the study,
 - e. the methodology that will be used,
 - f. the major sources or theoretical systems that the author will use.
4. Briefly examine the endnotes and bibliography. From what kinds of literary sources does the author obtain his/her information? Examples of 'types' of sources are history books, primary sources such as the writings of Aristotle, sociology books, science journals, popular magazines, newspaper, etc. Are there one or two types of sources that the author seems to heavily rely upon? What might this tell you about the book?
5. Briefly examine the index. What kinds of subject matter are referred to most frequently? Look for the subjects that seem to be discussed at length in more than one section of the book.
6. Finally, read the first and last page or page and a half of the first chapter, one middle chapter, and the last chapter (excluding appendices). If you were completely pre-reading this book, it is best to quickly do this for all of the chapters. What did the author say he was going to in the chapter on his first page? Reading the last page, what was the author's main conclusion? Finally how do these two things compare. How important to his main purpose, in your opinion, was the material in that chapter? How did it add to his argument or purpose?
7. Having completed all these tasks, what is your overall impression of the book? What is its purpose? Does it have an unstated purpose? What might be the author's biases? How valuable will it be for what you want to learn? Please be aware of these questions for your future work and the required book review.

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Conclusion: The purpose of this exercise is to teach you **to understand a book quickly and accurately!** Pre-reading the book is a skill which provides you with a systematic method for choosing resources for term papers, work reports, graduate school assignments, etc. If you can develop this skill, you will save hours of haphazard and hit-and-miss research.

Acknowledgments:

The reading criteria that you will be using to prepare your book reviews are largely adapted from the following books:

Adler, Mortimer J. and Van Doren, Charles. **How to Read a Book. Revised Edition.** New York: Simon & Shuster, 1940, 1967.

Clinton, Dr. J. Robert. **Leadership Series. Reading on the Run: Continuum Reading Concepts.** Altadena: Barnabas Publishers, 1996.

This exercise was adapted from a document prepared by Paul Shrier.