Junior Seminar:

An undergraduate research incubator

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These slides are available at:

www.mathsci.appstate.edu/~jlh

Click on "Slides and Posters"

The Setting

The math honors program at Appalachian State includes:

Sophomore Honors

Topic: Techniques of proof.

Goal: Provide axiomatic foundations for higher level mathematics.

Junior Honors seminar

Topic: Varies – this course can be repeated for credit. Recent topics include:

- Twentieth Century Mathematics
- Cryptography
- Mathematics and Music
- Applications of Geometry

Goals: ◇ Illustrate connections between subdisciplines.

◇ Improve basic research, writing and typesetting skills.

Senior Honors thesis

Basic Research Skills

- Searching for information

  – web search

  – MathSciNet

- Locating articles

  – library

  – full text electronic access

- Summarizing information

  – in a "found" or "provided" article

  – in a sentence (bibliographic annotation) or
    a paragraph (abstract or review)

- Constructing a bibliography

- Typesetting

- Selecting a topic

Sample Exercises

Math and Music   Search Exercise

Gather information on one of the following topics from the library or the web, and write one or two paragraphs about it. Include documentation on your sources (web URLs or bibliographic information).

1. Harry Partch and microtonal scales

2. Harry Partch's instruments

3. John Cage and microtonal scales

4. Microtonal scales used by composers other than Partch and Cage

5. Pentatonic scales

6. Lucy tuning (Charles Lucy)

7. John "Longitude" Harrison (inventor of Lucy tuning)

8. Other unusual scales or tunings not listed above

Math and Music   Summary Exercise

Write a short summary (100-250 words) of the attached article. You should:

Clearly describe the central idea of the article.

Assume that your classmates are your audience.

Avoid grammar and spelling errors.

Include a bibliographic entry for the article.

Suggestion: Try reading your summary aloud.

Math and Music   Search and summarize

Use MathSciNet *http://www.ams.org/mathscinet/* to find a recent journal article on an application of Fourier analysis or partial differential equations. Locate the article in the library. Turn in the following:

a) A xerox of the first and last pages of the article.

b) A printout of the MathSciNet review of the article.

c) A one paragraph summary of the article. (This may be hand-written).

d) A *perfect* bibliographic entry for the article, using the examples from *Mathematics into Type* as models.

Math and Music   Annotated Bibliography

(This was preceded by a topic selection and source search exercise.)

Write an annotated bibliography for your thesis topic. Include the following:

1. A short description of your thesis topic.

2. Complete bibliographic entries for each of the four sources you have located. (You may include more sources, if you like.)

3. Follow each bibliographic entry with a short summary. The summary should indicate how the source is related to your topic.

Additional instructions:
Type it.
"Short" means between one and four *complete* sentences.

Helpful Materials

- Style guides, etc.

  - Steenrod et al., *A Manual for Authors of Mathematical Papers.* (Revision of an article in the Bull. AMS, **68**, no. 5, 1962.)
  - Steenrod et al., *How to Write Mathematics*, AMS, 1973. (See www.ams.org/bookstore)
  - Swanson, *Mathematics into Type,* AMS, 1999. (See www.ams.org/bookstore)
  - Gerver, *Writing Math Research Papers*, Key Curriculum Press, 1977. (See www.keypress.com)
  - Strunk and White, *The Elements of Style,* Allyn and Bacon, 2000. (See www.amazon.com, for example.)
  - Shertzer, *The Elements of Grammar,* Longman, 1996. (See www.amazon.com, for example.)

- A web-based library guide.
  (See www.mathsci.appstate.edu/~jlh/library/lap.html)

- Software handouts on equation typesetting.

Library Access Page

Appalachian State University Libraries

- [ASU Libraries'](#) Home Page
- The [catalog](#)
- View your [library record](#)
- [Renew](#) books
- Library [hours](#)
- How to establish [proxy service](#) for off-campus electronic access.

Document Delivery

- [Books and articles](#) can be ordered through ABC or Interlibrary loan.
- Articles can be retrieved via fax via from [Ingenta](#). Charges are paid by the library.
  (This service was previously provided by CARL.)
  The library has prepared [instructions](#) on setting up a profile.
  (If you had a CARL account, your Login ID is your SSN,
  and your password is the password for your CARL profile.)

Full Text Electronic Journals

- The [electronic math journals](#) with current issues available at ASU are listed here.
- Back issues (over five years old) of many journals are available via [Jstor](#).
  Math and statistics journals are listed separately.
- All ASU holdings appear in the [catalog](#) and this [list](#).
- The university system recently arranged for access to many Elsevier journals.
  To access these journals, you can go to [www.sciencedirect.com](#) and click on
 "Group-Wide Login". (They also appear in the lists above.)

Indices

- [Mathscinet](#) offers access to the Mathematical Reviews and Current Mathematical Publications.
  A 24 page manual is available in [pdf format.](#)
- The [MATHSCI](#) database (database 239) at [Dialogweb](#) includes the Current Index to Statistics (CIS),
  Index to Statistics and Probability (TUKEY), Technical Reports in Computer Science (STR),
  and STRENS Recreational Mathematics (SRM). To get a password for this service, contact [J. Hirst.](#)
  This rather expensive service is billed to the library on a per-use basis. It's good to read the [instructions.](#)
- Limited free access to the [MATH database](#) (Zentralblatt) and the [MATHDI database](#) (for Math education)
  is available. Extended (not free) searches can be done at [STN on the web](#). To save money, please use this
  service after normal business hours. To get a password, contact [J. Hirst.](#)

Using the Equation Editor

To access the equation editor in Microsoft Word, go to the Insert menu and choose Object... You should see a list that includes some version of Microsoft Equation. Note: If you see it at any point, turn off "Float over text" before clicking OK.

An empty window and a palette of mathematical symbol menus will appear.
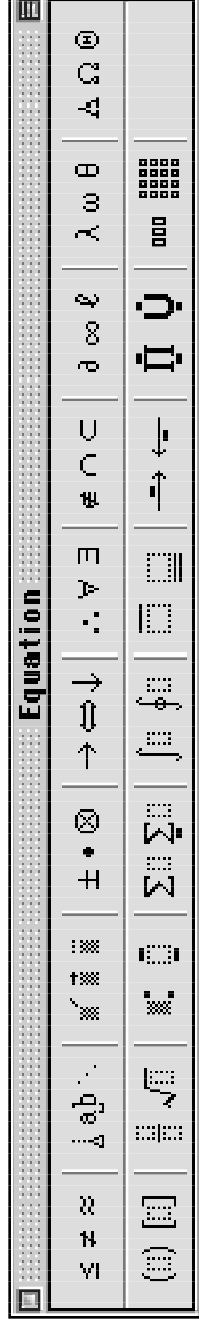
Most of these are self-explanatory. Mouse over an area, and a description of each will appear:

relational symbols	spaces, ellipses	primes, dots, hats	operators	arrows	logical symbols	set symbols	miscel-laneous symbols	lower case Greek	upper case Greek
paren-theses	fractions, roots	sub/ super scripts	sums	integrals	over/ under bars	labeled arrows	product, union, intersect	matrices	

Each is actually a menu with many choices.

Example: To build the inequality $\left(\dfrac{x+2}{x}\right)^2 \le \sqrt{10}$

1. Get out the parentheses from that menu – empty parentheses will appear in the window.
2. Get the fraction out of the menu – an empty numerator and denominator will appear.
3. Type in the numerator and denominator, tabbing between them. Keep tabbing until you are out of the parentheses (or you can use the mouse to click where you want to move).
4. Add the power by getting the superscript out of the menu. Put in the 2.
5. Choose the inequality.
6. Choose the square root and then fill it with a 10.

(Excerpted from a handout created by Prof. Holly Hirst)