

Topic 1 • Science Literacy Book Report (100,000 points)
PHYS-205 (H14) & PHYS-309 (3) • Spring 2004

Purpose

Science Classes

As a student, you have received science and science related information from your teachers. Whether you believe it or not is up to you. But a professional has taken the time to determine what sorts of things are important to know and with how much detail, both for the purposes of the courses you are taking and for the more general purpose of “Science Literacy”, to help make you a better citizen and better able to function in our science & technology driven 21st Century.

How Will I Get Science Information in the Future?

For some of you, your courses at Western Michigan University may be the last time you will have the benefit of someone directing what science you are exposed to. So, what happens when you get to the “real world”? Well, you may be bombarded with information from all sorts of sources: your job, newspapers, magazines, books, television, radio, movies, the Internet, friends, conversations overheard while standing in line somewhere – you name it. What these methods may lack, though, is the control and expertise of your teachers. You can find all sorts of amazing information on the Internet, but you would have to be very naïve to believe 100% of *everything* you read there. Much of our news is dominated by politics, but how much science do our politicians know? At the moment, we have exactly one professional engineer and one physicist in the House of Representatives (both of these men are from Michigan – you *should* know who they are, but probably don’t), none in the Senate. Most of Congress is made up of lawyers. While there is nothing wrong with studying the Law *per se*, legal arguments do not follow the same rules and purposes of scientific arguments. Therefore there is nothing that requires an environmental cleanup bill, for example, to have anything to do with either the environment or cleaning it up. Likewise, the talking heads we get our news from on TV are not trained in science and technology for the most part. I don’t know what Dan Rather or Connie Chung majored in at college, but I can probably bet it wasn’t Physics. They may have, unlike you, been able to graduate from college without ever having had a Physics course. Even on the cable channels, one of the hosts of a computer show I used to watch is now doing a cable show on gardening – go figure.

So how will you evaluate information on your own? This is possibly something that you have never thought about, but Dr. Phil and other professionals have. Dr. Phil’s approach is to have you read a book and examine what you read and how it affects you, as well as whether you believe it. (You don’t have to.)

Learning to “Parse” Information

Evaluating what you read in this context is very much in line with definition 3 of the verb *parse*:

parse (pārs) *verb*

parsed, pars-ing, pars-es *verb, transitive*

1. To break (a sentence) down into its component parts of speech with an explanation of the form, function, and syntactical relationship of each part.
2. To describe (a word) by stating its part of speech, form, and syntactical relationships in a sentence.
3. To examine closely or subject to detailed analysis, especially by breaking up into components: “*What are we missing by parsing the behavior of chimpanzees into the conventional categories recognized largely from our own behavior?*” (Stephen Jay Gould).
4. *Computer Science*. To analyze or separate (input, for example) into more easily processed components. Used of software.

verb, intransitive

To admit of being parsed: *sentences that do not parse easily*.

[Probably from Middle English *pars*, part of speech, from Latin *pars* (*ōrātiōnis*), part (of speech).]

Source: Microsoft Bookshelf '95 (American Heritage Dictionary of the English Language (Third Edition))

Dr. Phil’s Definition of Science Literacy

science literacy *n.* An exposure to science in a historical context that serves to allow a person to observe the world around them with understanding, deal with technological applications at home and work, appreciate the distinction between fact and speculation in the media and politics, have a working knowledge of numbers and the scale of the universe, and be able to pursue more information if desired, as a function of everyday life.

Philip Edward Kaldon, Fall 1995

Books as a Source of Information

From all the sources listed in **How Will I Get Science Information in the Future?**, most are very difficult to evaluate. Dr. Phil can’t easily watch hours of VCR tapes or interview your friends along with every paper he reads to compare your impressions with the actual information being presented. So by narrowing the choices to one medium – books – we can have a little control and consistency between papers.

For more than ten years Dr. Phil has been building up a booklist of suitable books. They are, as you shall see, not just Physics books, but cover all the Natural Sciences, Engineering, Computers, Technology, Medicine and the Morality and Ethics of using these. The total list is kept around a hundred titles. Books come on and off the list from time to time, sometimes because Dr. Phil gets sick of reading too many papers on *Airframe* or *Jurassic Park*, etc., and sometimes because some books work better with some classes (such as PHYS-309) than others.

Because this is not strictly a Physics paper but a Science Literacy paper, the range of books is considerable. There are fiction and non-fiction titles, biographies, science fiction, mysteries and *technothrillers* – books that straddle the line between science fiction and current reality – from some popular best-selling authors as Tom Clancy and Michael Crichton, covering topics that include Physics, Biology, Chemistry, Engineering, Computers, Mathematics, Technology, Medicine, etc.. The list is anything but boring.

It is easiest to pick a book you have *not* read before. And if you pick a title from the booklist, that’s it. However, you may decide that (a) you have read everything on the list, (b) read everything you think is interesting on the list or (c) waited too long to get the book(s) you were interested in from the library and are now stuck. You *may* read a book that isn’t on the booklist, but you *must* get Dr. Phil’s approval beforehand and be prepared to hand in a draft of your paper at least one week before it is due. If you go ahead and write a paper on a book that Dr. Phil has not approved anyway, there is a 100,000 point penalty.

Movies as a Source of Information

It turns out that many of the books on Dr. Phil’s booklist have some connection to a movie or a TV program. Many of these are mentioned in the booklist. If you are tempted to avoid reading a book by watching the movie version – don’t. For one thing, the movies are almost always different than the books. And not only has Dr. Phil read all the books, he has seen all the movies (and owns most of both). So if you just watch the movie, you are going to get caught (and it’s a 90,000 point deduction). Secondly, in most cases, even jaded students like you will usually conclude that the book is usually better than the movie. While there is a lot to say about movies, there isn’t the time to contain all the information content of the book. Movies, at best, hold the flavor of the book.

Having said that, it can be worthwhile to *compare* what is in the book and movie of a particular combination. Currently Dr. Phil is using Book/Movie combinations for his second-semester Physics courses (PHYS-115 and PHYS-207 at WMU). You can, however, do this on your own *IF* you agree to a change in the rules. Having more to evaluate means you have to write a longer paper – it’s only fair. You also have to split your paper between the book and the movie.

Scope of the Paper

A booklist only about Physics topics is likely to be a very short and boring list. While it is true that “Everything is Physics”, there is nothing more pathetic than someone reading a really good medical story

and then writing a paper where you try to find the one or two things that seem like PHYS-205 Physics, and so end up talking about the “Physics of taking someone’s blood pressure”. While the use of a *sphygmomanometer* is rather fascinating, even Michael Crichton isn’t likely to spend much time to reveal any information about its use in the pages of one of his technothrillers.

The Assignment

- Select a book from the “approved booklist” or get approval for a different title from Dr. Phil.
- You should not read a book that you have already read, it only makes the assignment harder. You may find that a book you are already reading for another class may be acceptable.
- Failure to read an approved book is a 100,000 point penalty.
- If you have ever had Dr. Phil before *and* you read any of the best-seller type books (Crichton, Clancy), you *must* read a “serious” book for this book report. Failure to comply with this rule will result in an 80,000 point penalty. If you try to submit a report on the same book that you have read for Dr. Phil before, there will be a 100,000 point penalty. This is a science literacy assignment after all, so we want you to learn something new.
- Book titles can be reported in a space provided on the first and second exams. If you don’t have a book title in mind, or you don’t remember it, you can leave the space blank. This is partly so Dr. Phil can see what people are doing and partly to remind you of this assignment. But it is not required.
- Read the book, especially with an eye as to how science is portrayed, what you may have learned that was new to you, whether you believe it to be accurate or whether you feel that the science issues were well explained. Remember that this is an assignment on science and technical literacy, so what you already know (or don’t know) is important.
- Each book in the booklist has a brief description of some points that Dr. Phil came up with. You do not have to agree with Dr. Phil. This is an opinion paper and your opinion matters. Personal anecdotes that tie in with what you have read are appreciated.
- This assignment is *not* just about Physics. This booklist is about science, engineering, technology, computers and the history, application, ethics, morality, and understanding of it all. So the paper is about this, too. To simply rate the book based on the “Physics” may be to miss the entire point – or in this case, a good chunk of the 100,000 points.
- Write a **4 to 5** page report, **typed, double-spaced** and a **single simple cover sheet**, on what you read, paying attention to the assignment. You can write more if you feel you need to, but **more will not** translate automatically into a higher grade. Good grammar and spelling are expected.
- **OR** If you want to write a paper comparing and contrasting a book with the movie version of the book, in the context of the assignment, you can expand the page count to **7 to 8** pages. (There is no extra credit for doing this, but sometimes it can be fun to really tear into both movie and book.)
- Dr. Phil is expecting that a “B” paper will satisfy the above requirements. Exceptional papers will be rewarded; problems will be deducted.
- Late papers will drop an additional letter grade (10,000 points) per calendar day, starting after 5pm at the end of the Grace Period.
- Papers are due at the start of class, or can be dropped off in Dr. Phil’s mailbox at the Physics Dept. office by 5pm on the due dates listed below.

NOTE: The most popular books, *i.e.* the ones Dr. Phil has read the most papers on, have been written by Michael Crichton (*The Andromeda Strain*, *Five Patients*, *The Terminal Man*, *Congo*, *Jurassic Park*, *Airframe* and *Timeline*) and Tom Clancy (*The Hunt for Red October* and *The Sum of All Fears*). They wouldn’t be popular (and rich) authors or have their stories turned into hit movies unless their writings were a lot of fun. Now not all of these nine books may be authorized for this particular semester, and no other Crichton or Clancy books will be approved, so don’t bother asking. But despite the fact that they show up in a lot of papers, there is no problem with many people writing their papers on the same book.

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Content

This is an Opinion Paper

For many of the papers you may have written in high school or college, they have *not* wanted you to have or express your own opinions. But this is exactly what we want here – Dr. Phil *wants* to know what you think, whether you liked the book, etc.

It is All Right to use “I”

Unlike some college papers, it is not necessary to write in a formal style. Since this *is* an opinion paper, it is okay – even encouraged – to say that “I think that...”.

This is Not a Fourth Grade Book Report

Back when you were a kid, most book reports consisted of “I read Book X. This happened and then this happened and then this happened.” What such a report really ends up being is just a discussion of the *plot*. The problem with this is three-fold: (1) Dr. Phil has already read your book, so he knows how the plot goes. (2) Writers like Michael Crichton and Stephen Hawking are best-selling authors because they get paid more than you do to write – they’re better at it. Why would Dr. Phil want to read your version of *The Andromeda Strain* when he can read the book? (3) Just replaying the plot of a novel or a list of topics covered in a non-fiction book or the events in a scientist’s life in a biography does not involve any analyzing of the subject. It is this analysis – thinking about what you just read, thinking about what you already knew and what you have learned – that is the heart and soul of this science literacy assignment.

You Can Be as Serious or as Light as You Choose

Some of the books are more serious in tone than others. Several of the books regard rather controversial topics. You are free to avoid them. One semester a student asked if they could write their paper as if they were writing a letter to someone and talking about their experience. Sure – as a writing technique it’s sort of a crutch, but it got the job done. Others have taken a more humorous tone, or have gotten hostile or offended. Just remember that you should be able to justify your comments. What is Dr. Phil supposed to make of a paper that says the book didn’t do anything for them and it was boring and too technical after Chapter Four, and then in conclusion they said it was a great book and they’d recommend it to anyone?

You Do Not Have to Agree With Dr. Phil

Most of these books are on the list because Dr. Phil likes them *and* they cover some subject areas that should make for good papers. However, everyone’s experiences and preferences are different. Very few people in the world are Physicists or Physics teachers, and there are certainly very few Dr. Phil’s in this world. So it would be surprising if you responded to every book the same way as Dr. Phil did – especially since a good chunk of the book list was read a long time ago when he was a kid and not a Ph.D. Physicist.

Since Dr. Phil asks for your opinion, you are free to give it. You hate the book. You can hate the assignment. You can decide that you didn’t learn a thing from the book. Fine. Great. Wonderful. Now just write it up. Give examples, be specific. Some of the very best papers in a particular semester have come from the same book where the students reach completely opposite conclusions.

Suggestions

The following are suggestions for ways to start your paper (or start thinking about your paper) if you are stuck.

· Why Did I Choose This Book?

For some, the reason might be as simple as “it was the only book I could find”. If you were a college student in 1903, you would have read a lot of books. In 2004, you can go to college and avoid reading books. So everyone’s experience is different. Just be honest.

· What Did I Know (Or Not Know) Before I Read This Book?

When you sit down to read a book, there is a lot of stuff that you bring to the table with you – this includes what you have learned in school, your life experiences, all the other books you have read in

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your life, many hours of watching TV & movies and what you are interested in doing. These are some of the things that will affect how you react to a book and these are some of the things that Dr. Phil would like to know about you, in order to understand your responses.

• What Did I Learn (Or Not Learn) From Reading This Book?

Remember, although you might need to discuss a plot point to explain something, your paper is not about what happened in the book, it is how you reacted to what happened. When we watch a play or a movie or read a novel or play a video game, we often engage in “a willing suspension of disbelief” in order to be entertained. Most people don’t really believe in wizards casting magic spells or the plots in James Bond movies or think that there really is a Darth Vader in a black helmet and cape that can use The Dark Side of the Force, or that terrorists set off a nuclear bomb at a Super Bowl game in Denver. But going along with the author is something we do to be entertained. Now, if you don’t buy it, you aren’t going to like it – we need to know this. If you don’t think that we really sent astronauts to the Moon (and some people don’t), then that will affect how you view any book about space travel. See how this ties in with the previous topic?

• Pick 2 or 3 Good Examples

This is a 4 to 5 page paper. You don’t have time to discuss every one of the topics/chapters in Stephen Hawking’s *A Brief History of Time* – so you can’t. A rule of thumb might be about a page for your introductions, a page each for two or three good examples and a page of conclusions. Provided you follow the assignment – you’ve got your four or five pages.

• Conclusion

You really do have to wrap up your paper. After all, the premise is that books are one way that you might learn something about or improve your science literacy, so did you learn anything? Or did you read something that supported what you already knew? How does this assignment or this book affect your “world view”? Would you recommend this book to your friends? ... to other students?

Draft Review (Optional = NOT Required)

If you wish, you may submit a typed, draft copy of your paper at least one week before it is due. Dr. Phil will take a quick read and look for (1) basic mechanical flaws and structural problems in your paper and (2) how your paper fits in with the concept of science literacy and the purpose of the actual assignment. In return, the clock stops while Dr. Phil has your paper – if Dr. Phil has your paper for two days, then you add two days to your due dates, etc. The draft will not be graded and the submission of a draft is *not* required. *If* you choose to use this option, you *must* turn in your draft with your final paper – if you *don’t* then your final paper *won’t* be graded. This is to keep Dr. Phil from going nuts “as I experience major *deja vu* from thinking that I already had made a comment about some aspect”. (Please note that the phrase “rough draft” is never used, which should suggest that the draft be fairly complete as a paper. This is just a free shot before it counts. What could be fairer?)

Please note: If you choose a non-booklist but approved book, you MUST submit a Draft.

Structure

Most of You Will Use Word Processing Software Rather Than Typing

The assignment describes a “typed” paper, but very few of you will actually use a real typewriter. In fact, most of you will use some version of Microsoft Word, on either a Windows PC or a Macintosh.

4 to 5 Pages, Double-Spaced, 1” Margins All Around

The goal here is uniformity of papers for everyone, as well as ease of reading for Dr. Phil.

Readable Font (Examples on Next Page)

If your printer/word processor cannot handle these, talk with Dr. Phil. These fonts and sizes have been selected so that the amount of typing in the average paper doesn’t differ by more than about ±10%, however you are allowed a choice so that it looks good to you.

Times New Roman 10 point font is a very readable font.
Times New Roman 11 point font is a very readable font.
Times New Roman 12 point font is a very readable font.
Courier 10 point font is a very readable font.
Arial/Helvetica 10 point font is a very readable font.
Arial/Helvetica 11 point font is a very readable font.
Century Schoolbook 10 point font is a very readable font.

NOTE: Handout may be reduced in size. Fonts will not display on the web page.

Spelling

Nearly all word processors contain some sort of Spell Checker. Use it. But you must know that computers, like calculators, are basically stupid machines. A spell checker cannot tell the difference between *two*, *to*, *too* or *Thieu* – all of which are pronounced the same. Word choice in English is very specific. Misspellings, especially of the author’s name (or Dr. Phil’s name), looks sloppy, as if the paper was written at the last minute and/or without any care.

Grammar

Reasonable grammar is expected in a college paper. This requirement is loosened slightly in some papers, because some students are not native English speakers and some papers may be written in a casual, often first-person style. However, your paper is supposed to be read – if your meaning isn’t clear or your sentences don’t make sense, your paper’s grade will suffer. Microsoft Word and other modern word processors may have a Grammar Checker feature, but unlike a Spell Checker, Grammar Checkers do not work very well and only find some sorts of errors. They work best with certain types of documents, such as company memos, in order to give all company documents that same “feel”. Your best bet is to proofread your paper for readability. But even among *good* writers, it can be very hard to proofread your own work. So you can (1) get a friend to read over your paper and see if they understand it or (2) go to the Academic Skills Center and have someone there go over your paper with you.

Additional Information

Sometimes students go beyond the book, by looking up topics in the dictionary or encyclopaedia, or going to the Web and searching the Internet. This is *NOT* required. But some students get enthusiastic about what they have read and want to know more. So you *may* use additional sources, but don’t use them as ways to pad your page count and cut down on how much you have to write. Additional sources and additional information go on *additional pages*.

No Need For Footnotes

Again, this is not a formal paper in the sense of many other college papers. It is not required that you footnote, or even give page numbers, for every point that you make or quote (or phrase) you use from the book.

Four to Five Pages

Please make a note that “4 to 5 pages” does *NOT* mean that 3¾ pages is “sufficient”. It is not. Dr. Phil interprets “4 to 5 pages” to mean FOUR FULL PAGES PLUS YOU MAY BE GOING ONTO THE FIFTH PAGE. You can write more than five pages, but there is no automatic reward for doing so. Some people, like Dr. Phil, just write “long”.

Padding Stunts

There are all kinds of “tricks” you could employ to try to make those four pages without writing four pages. But since Dr. Phil has specified the margins, line spacing, fonts, and further suggests that you do not indent new paragraphs by thirty spaces or put one or more blank lines between paragraphs, or start the first page halfway down because you are repeating as a header the information that is already on your cover sheet – these “tricks” to pad your paper won’t work. And endlessly repeating the same phrases or thoughts will be noticed because your paper will be read. And if you want to include a long quote from your book, the proper way to include a long quote of more than two lines on a page is to *single-space* the

quote, so that it is (a) set off, (b) easily showing that it is a quote and not your writing and (c) so that it does not take up an excessive amount of space. Sorry.

Dr. Phil has in the past received papers with 3" top and bottom margins and 2" side margins. This leaves a typing area of only 4 1/2" by 5"; coupled with a 14 point or 16 point font, and even a four page paper under these printing conditions contains almost no text. Hardly seems fair to everyone else.

It's the worst phrase in the world for the Y2K4 student, already struggling to get to work and maintain a home life: "And there will be a paper due..."

So Just What Do You Mean By A "College Paper"?

A college paper is a reflection on you as a student, both in appearance and the quality of the work. It is expected that the writing assignments will be handled in a competent, serious and professional manner. To that end, a college-level paper by Dr. Phil's definition contains the following non-negotiable elements:

- Typed (word processed), double-spaced
- Margins: 1" all around
- Page numbers (by hand is acceptable)
- Single, simple cover sheet
- Readable standard font/typeface
- Good spelling
- Reasonably clean and proofread grammar
- Stapled in upper left-hand corner
- SINGLE-SIDED ONLY!

1 ← Staple in upper left-hand corner!

Title of Book <centered>

Your Name
PHYS 205/309
Spring 2004
Date

The Cover Sheet CANNOT Possibly Be Considered To Be Page 1

(If you can't figure out how to do this, either number your pages by hand, or put the cover sheet at the *end* of the computer file.)

MANDATORY DEDUCTIONS FOR FAILURE TO COMPLY WITH THESE PERFECTLY REASONABLE RULES.

NOTE: Given that printing and typing are not always carefree processes, if you find that the printer does not line up properly or is otherwise giving you trouble at the last minute, write "Printer Trouble" on the back of the last page and very briefly describe your troubles; this lets Dr. Phil know that you were under duress and wouldn't normally turn in a bad looking paper. You can then drop off a cleanly printed copy of the paper after the deadline, if one is required. PLEASE! Keep copies of your paper on *two* floppies.

IF YOU USE A REAL TYPEWRITER, then spell checking and corrections are not automatic. Make sure, however, that you go over typed papers and make minor corrections with a pencil.

**IF YOU DON'T CARE ABOUT YOUR PAPER,
WHY SHOULD DR. PHIL?**

The Seven Statements

If you ask Dr. Phil what he wants in a paper or how to start, this is what he will tell you:

- (1) Do *not* spend the whole paper summarizing the plot (*assume Dr. Phil has read the book – he has*) and
- (2) Do *not* cheat and just rent the movie instead of reading the book (*assume Dr. Phil has seen all the movies – he has – 90,000 point penalty*) (see the assignment for restrictions on movie comments),
- (3) You might want to explain how you chose this book (sometimes it's because it was the only one the library still had),
- (4) when you sit down to read a book, you always bring something to the table, even it is that you know nothing about the subject, or have never read any science fiction or whatever – it is *this* stuff, what you already knew, that is part of what Dr. Phil would like to know about, plus ...
- (5) what you learned or did not learn from the book. If fiction, you might tell why you believed the author – or did not. If non-fiction, whether the author was understandable.
- (6) Give a couple of examples to show me that you read the book, but you won't be able to talk about everything. *Again: DO NOT SUMMARIZE THE BOOK'S PLOT BEYOND 2 SENTENCES!*
- (7) Any kind of personal story or anecdote or current events that connects with your book is *super*.

This paper is not about PHYSICS, but about SCIENCE LITERACY (Sciences – including Physics, Engineering, Technology, Computers, and the Morality and Ethics Involved in using same).

Due Dates

PHYS-205
Topic 1 – A Science Literacy Book Report
Due Thursday 25 March at 5pm
Grade Period Ends: Monday 29 Mar. at 5pm

PHYS-309
Topic 1 – A Science Literacy Book Report
Due Thursday 25 March at 5pm
Grade Period Ends: Monday 29 Mar. at 5pm

The Grace Period Means You Can Turn In Your Paper on Thursday, Friday or Monday, as You Choose. If you submitted a Draft Paper to Dr. Phil, you must include the Draft with your Final Paper. NOTE: Watch Out For Exam 3

A Writing Sample

U-571 is about an American submarine that is sent out on a mission to infiltrate a wounded German U-boat and take its Enigma machine and codebook. The Enigma is the coding machine that the Germans used to keep their messages secret from the Allies. To not get one was to guarantee failure. Anyway, soon after the boarding crew grabs the machine, the American sub sinks and the Americans are stuck on a wounded U-boat. The movie is about what happens to them as they try to get back to America alive with the machine.

I really liked the movie and even though I don't know how submarines work, the subs in U-571 definitely appeared realistic. The actors looked as though they had been trained in the Navy. It had excitement, adventure and tension. My one gripe is that you never get to know the characters. I mean, you how they act and how they feel at any particular moment, but you never really know them. Even though I didn't like that, I think that wasn't as important to the plot when the screenwriters wrote it. I think that what they did want to convey is what makes a captain a captain, because a lot of the movie is the lieutenant's conflict over whether he would sacrifice a crew member or save the rest of them. Overall, this is an exceptionally good movie.

Chris Molnar, age 12
Sylvan Christian School
The Grand Rapids Press
Friday, 28 April 2000
The Weekend p. 31

This Example Typed in Microsoft Word 95/7.0c, with 1" margins, double-spaced and with the Times New Roman 12-point font, printed on a Hewlett-Packard LaserJet 4ML printer.

So what does a paper for Dr. Phil look like? I've avoided simply copying what an "A" paper looks like, because then I'll just get 25 to 100 papers just like that. But to some extent, it looks a lot like what this young movie reviewer has done regarding the Spring 2000 movie *U-571*. Now obviously this is a lot shorter than your assignment and Mr. Molnar's agenda was very different than yours – he was a kid reviewing a movie for a newspaper. But in a little over half a page, Mr. Molnar has given a *brief* description of the plot of the story, identified that he doesn't know a lot about submarines *but* that he felt that what was presented was believable, and that the characters, while not well-rounded, behaved in a believable manner. Now explain how you picked this particular book to read, add a few pages talking about what you know or don't know about the science, engineering or computer technology (or the morality and ethics of using same) in the book you are reading, and *then* you'll have a Dr. Phil book report. More or less.

Topic 1: The One Page Version (100,000 points)

1. Pick a book from the booklist. If you don't want to use a book from the booklist, you *must* get approval from Dr. Phil *and* turn in a Draft Paper at least a week before the due date. If you had Dr. Phil before, you can't use the same book and you can't read a second best-seller, if you read a best-seller the first time.
 2. Read the book. This is a Science Literacy assignment, not just Physics. So read the book with an eye toward what you finding about all the sciences, engineering, technology, computers, medicine, and the morality and ethics of using them. Is the author believable? Understandable?
 3. Think about what you brought to the table before you read the book – what you know, your experiences.
 4. Consider what you learned from the book. Is it new to you? Or is it something you already knew? This is an opinion paper, so what you know and what you think does matter. You do not have to like your book.
 5. Write the paper. Do not just retell the plot or story. Dr. Phil has read the book and so have you. Start from there. You might begin by telling why you selected this book. Then pick 2 or 3 things and talk about them in the context of (3) and (4) above.
 6. Be careful to make sure you are talking about the book your paper is on. Many of these books have movie versions – Dr. Phil has seen them and knows the differences. He has also read all the books. (You may choose to write a paper about both book and movie, adding in a section about the differences between the two, as well as the assignment, but the page count goes up to 7 to 8 pages.)
 7. The paper should be written in English with correct spelling and reasonable grammar. Because it is an opinion paper, you may use the word "I" – as in "I think that..." (first-person is acceptable).
 8. The paper should be 4 to 5 pages typed (probably on a PC or Mac using a word processor in Spring 2004), double-spaced, with 1" margins all around, a single simple cover sheet, and numbered pages. The cover sheet cannot be page 1, and 4 to 5 pages means that there are at least 4 complete pages of text without extra blank lines at the beginning or end. You may write the page numbers by hand if you wish.
 9. Most computer printers and word processors allow you to control the font (lettering) size and style. Acceptable fonts are: Times New Roman (10, 11 or 12 point), Courier (10 point), Arial/Helvetica (10 or 11 point) or Century Schoolbook (10 point). These produce text all within ±10% of each other. If you have printer problems, contact Dr. Phil. If you typing on a real typewriter, see Dr. Phil.
 10. You may, if you want to, turn in a Draft Paper at least one week before it is due, for a free evaluation by Dr. Phil. If you are reading a book not on the booklist and Dr. Phil approved it, you must submit a Draft Paper. In either case, if you turned in a Draft Paper and Dr. Phil marked it up, you must turn in that marked up Draft with your Final Paper, or your Final Paper will not be graded. The number of days that Dr. Phil has your Draft are added to your Due Date, so there is no penalty for writing a Draft.
11. Papers are due on Thursday 25 March 2004 by 5pm. You have a Grace Period that extends until Monday 29 March 2004 at 5pm – that means you can turn in your paper on that Thursday, Friday or Monday with no penalty. After that, there is a 10,000 point/day penalty.
12. Major penalties: Writing about the movie and not the book—90,000 points. Writing about a book that was not approved or on the booklist—100,000 points. Previous Dr. Phil students reading the wrong book—80,000 or same book—100,000 points. Writing only about the Physics in a book that isn't about Physics—or—Writing only about the plot of a book with no analysis—the fraction of 100,000 points that the offending section covers. Other minor penalties assessed based on severity/frequency (2000 points ea.)
 13. Papers that meet the minimum qualifications are worth at least a "B". Exceptional papers will be rewarded; problems will be deducted.

Dr. Phil likes most of the papers he gets, but it takes some effort to get everyone to take this assignment seriously.

Full Book Descriptions at: <http://homepages.wmich.edu/~kaldon/classes/ph205-h14-bl.htm>

PHYS-205 (H14) & PHYS-309 (3) (Kaldon)
Western Michigan University
Booklist—Spring 2004

(KEY: H - Hope College; W - WMU Library ; K - KVCC Library ; L - KELLY Libraries ; V - GVSU Library ; R - GRCC Library <old data>)

This list stays in constant flux, with additions suggested by faculty, students and friends. Your comments are always welcome. Some of the entries are out of date and new works added since I last checked a particular library. Some popular titles may be available in Paperback. Some older titles are included even though I haven't seen them listed anywhere. Public libraries and libraries at other colleges have not been checked. Many titles should be available through area bookstores, or the main WMU Bookstore. 01/08/04

***“Science, Engineering, Technology, Computers, Math,
and the Morality and Ethics of Using Same” – Dr. Phil***

Over the last few years I have been working on a booklist for reading assignments in all my classes. Since this class lasts for 14 weeks, there is time for some “recreational” reading – my small contribution is to perhaps pique your interest into reading something that is “good” for you. My office is always open for science literacy discussions of books, movies and bad television.

First Up

----- **Frankenstein: A Modern Prometheus** / Mary Shelley I,III,VI

When I first started thinking about a booklist, it was because I had heard of an engineering school that required all of its freshmen to read **Frankenstein**. Not the 1930s movies, but the original early 19th century ghost story. Although there are other contenders, I personally date Science Fiction from the writing of this book. This is a story in ethics, of taking responsibility for your science and your creative genius. So even though I don't have a good citation for this, surely you can find a copy of this work somewhere. If you've only ever seen the old black & white movies, you'll be very much surprised.

• Science People

H W K L V - Surely You're Joking, Mr. Feynman I,II,IV,V

and H W K L - - What Do You Care What Other People Think? both by Richard Feynman
Two very funny accounts of *The Manhattan Project*, a life as a physicist, being on the California school textbook board, the space shuttle Challenger commission, painting and playing the bongo drums. **These are short books - you should read them both for this assignment.** For those of you who might get caught up in the fun, there is another (non-science and therefore not eligible) book, *Tuva or Bust!* by Richard Leighton, that documents Feynman's last great adventure to try to visit legendary Tannu Tuva in the heart of Central Asia, having once seen only a postage stamp from the place and being amazed that the country absorbed by the USSR had a capital with no vowels. One just has to want to visit a place like that, if you're Dick Feynman. (There is also a movie, *Infinity*, about the Los Alamos years, with Matthew Broderick and Patricia Arquette as Mr. & Mrs. Feynman, but no one has ever seen it – it showed up in Holland at the Knickerbocker Theatre in the summer of 1997.)

H W K L - - Genius: The Life and Science of Richard Feynman / James S. Gleick II,IV,V,IX

Feynman's own books at the beginning of the list are a lot of fun, but they are his stories, the way he remembers them. This is a very complete, and often poignant, story of a very complex and unconventional scientist (who never seems to do ordinary science) and professor (who never seems to do ordinary teaching). Well written, but I warn you that physicists seem to like it!

H W K L V R The Double Helix / James D. Watson I,II,IV,V

-or- H W K L V - What Mad Pursuit / Francis Crick I,II,IV,V
Both books are about the race to figure out the structure of DNA. Watson's is the classic that surprised many with its frank portrayal of how scientists really do science. On the other hand, the original title for **The Double Helix** was supposed to be **Honest Jim**, which most people who knew Jim Watson felt was a little overboard. Crick finally decided that he had had enough of that serious version and finally wrote his own, less reverent, but probably more accurate tale. (There is a BBC TV movie called **Race for The Double Helix**, starring Jeff Goldblum as the geeky American Watson, that captures the spirit of the whole adventure of searching for the DNA structure very nicely.)

- W K L V - Rosalind Franklin and DNA / Anne Sayre II,IV,IX

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Watson's **Double Helix** has been the classic of a generation; Crick's **What Mad Pursuit** puts a lid on some of Jim's exuberant self-aggrandizement. One of Watson's creations is a character named **Rosie**, the personification of the embittered old maid of science – who just happened to do the X-ray diffraction work crucial to W&C's Nobel Prize winning theory without her knowledge. The problem is that “Rosie” didn't exist, and this author wants to try to set the facts straight. (The Nobel Prize committee does not award prizes posthumously, which is why you didn't know.)

H W K L V R The Making of the Atomic Bomb / Richard Rhodes (886 pages) II,IV,V,IX

Probably too long for this class, I mention it because (a) Rhodes is not a scientist, but like Tracy Kidder mentioned below, he is simply just a very good writer, and (b) this is absolutely the most complete history of the Manhattan Project that you'll find in an unclassified library. No matter your feelings on the ethics of the result, the science and events that led up to the Bomb and the incredible grouping of scientific minds in one place that did it, is one of the 20th century's great stories. To me, the best part is that he not only explains what is going on, but weaves a story that lets you understand what the scientists did and did not know and the whole politics of the Manhattan Project.

--- **L V - Lonely Hearts of the Cosmos** / Dennis Overbye II,IV,V

A look into both the people and astrophysics in the search for the origins of the universe, and also a very human tale of how grad students and researchers get treated by each other. Is the Hubble constant for the expansion of the Universe equal to 50 or 100? It's a forty year old feud that takes place in public meetings and in scathing attacks in print.

H W K L V R A Brief History of Time: From the Big Bang to Black Holes / Stephen W. Hawking. I,II,IV

Probably the first physics book to stay on *The New York Times* best-seller list for months. Very readable treatment of modern cosmology. They made a documentary movie called **A Brief History of Time**; probably one of the first physics movies to even run in real theatres. I first saw it at Hope College's Knickerbocker Theatre. There is actually a book called **A Viewer's Companion To A Brief History Of Time**, which Hawking describes as the book about the movie about the book.

H W K L V - Infinite In All Directions / Freeman J. Dyson II,IV,V

Dyson is a very interesting human being, besides being someone not enough people ever listen to. One of the essays comments on how NASA shouldn't put all its eggs in one basket with a single, large, expensive Hubble Space Telescope - this written before the HST was launched and its nearsightedness was discovered.

H - - L V - Living Fossil: The Story of the Coelacanth / Keith S. Thomson II,IV

The very first science book I read on my own was a little Scholastic Book Service paperback that I had bought for 49 cents (or so) called **Search for a Living Fossil**. This is a much more complete history of the accidental discovery of coelacanths living in the 20th century, thought to be extinct for some 70,000,000 years. (**Jurassic Park** come to life!) The ancient fossil coelacanths were small; there is a lifesize model of a coelacanth in the first floor geology/fossil exhibit in Rood Hall on the WMU Campus.

H - - - - QED: The Strange Theory of Light and Matter / Richard P. Feynman (1985) II,IX

This booklist has had some books about Feynman, it seemed with the addition of the Modern Physics students to the booklist, that one should add some of Feynman's best known work. QED stands for Quantum Electro-Dynamics, and there probably isn't a better person to describe this in a non-textbook that “the Chief”. I'll admit, I haven't looked at this one for a long time (I was a poor graduate student when this came out, so I didn't buy it at the time), so you should go for the biographies if this seems too tough

H - - - - Lise Meitner: A Life in Physics / Ruth Lewin Sime (1996) II,IV

Elsewhere in the booklist is a book about Rosalind Franklin, whose X-ray crystallographic work led Watson and Crick to determine the structure of DNA and win the Nobel Prize. Franklin probably should have shared in this triumph, but her untimely death from cancer prevented any arguments or revision of history as to who did what. (The Nobel Prizes for science cannot be given posthumously.) Lise Meitner, on the other hand, died in 1968 and there is no question that she was robbed of a Nobel Prize for a crucial bit of Physics that led us into the Atomic Age. If you have a shred of decency in you, you'll be appalled at how Meitner was treated by the nearly completely male Physics community, but I wouldn't want to put opinions in your head.

H - - - - Nobel Prize Women in Science: Their Lives, Struggles, and Momentous Discoveries / Sharon Bertsch McGrayne (1993)

II,IV

Sharon Bertsch was, as I recall from a talk I heard her give on this subject, a journalist in Michigan for a time, so there is a nice local connection, and is married to a physicist. You might ask what the latter has to do with this mini-review. Well, consider that many of the women scientists in this book were either assumed to be merely the assistants of their husbands, or not suitable to be seen in the public halls of science and so toiled in basements, attics, or tutored advanced students in their homes. Many of the earlier stories are about women who were paid nothing for their teaching and research, simply because they were women. The stories of Rosalind Franklin and others denied the Nobel Prize are also included here, not because of some post-modern feminist revisionist thinking,

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but because scientists today have recognized their real contributions. Considering that there are many in science who unabashedly are scrapping for the big prize, it is remarkably refreshing to read success stories against a backdrop of odds that seemed guaranteed to create only failure.

• **Space, The Final Frontier**-----
H W K L V - The Right Stuff / Tom Wolfe I,II,IV,V

This very popular book about the birth of the Astronaut corps and their transformation by the media into Heroes was made into a movie that was supposed to launch John Glenn into the White House in 1984. Didn't happen. Actually, there is a lot more in the book than is in the movie, but you might want to sneak a peak at the movie if you aren't familiar with some of the gadgets of aircraft flight testing and spaceflight - the movie is mostly pretty accurate. (But don't just review the movie!)

----- Apollo 13 (original title: Lost Moon) / James Lowell & Jeffery Kluger I,II,IV,V,IX

Forget science fiction adventure billions of light years away: imagine being one of just three human beings, really and truly separated from the teeming billions on Earth by one-quarter of a million miles of the real hard vacuum of space... and having something go seriously wrong with your spacecraft. Lowell commanded the real Apollo 13, the mission that didn't make it to the Moon, wrote this compelling story. Tom Hanks always wanted to do something about this mission, and when Ron Howard ran across Lost Moon, their agents got together and...

----- October Sky: A Memoir (original title: Rocket Boys) / Homer H. Hickam, Jr. (1998) I,III,IV,V

One of the real sleeper movies of early 1999 was October Sky, based on this real-life story of a kid who goes from a dead-end future in the West Virginia coal mines to building model rockets with some friends -- to getting serious about rocketry and eventually working with the Big Toys that NASA operates. For most of us, the era of Sputnik is as foreign as living in a company town in the middle of nowhere.

----- Dragonfly: NASA and the Crisis Aboard Mir / Bryan Burrough (1998) II,IV,V

Fire, poisonous gasses, collisions, uncertainty about who is paying the bills -- these are all things that can make life tense on Earth. Imagine having them happen in Low Earth Orbit. In the summer of 1979, America's space station, Skylab, fell back into Earth's atmosphere -- a victim of solar max activity swelling the atmosphere, delays in getting the Space Shuttle flying and a Congress too cheap to buy an adapter to allow a rocket motor to be put on Skylab and save it. While we are still waiting for the assembly of the next American space station, NASA rented some space on Mir (Russian for peace). With the end and breakup of the Soviet Union, Mir's history has been pretty much a roller coaster. Kept on for years past its design life, because it is all that either NASA or the Russians have in space, an odd collaboration between former Cold War adversaries aboard the "dragonfly" in the sky.

• **Science Fiction and Technical Novels**-----

H W - L V R Rendezvous with Rama / Arthur C. Clarke III,V,II,X

I read this one for a high school physics class book report and concluded that this is actually a physics textbook superbly disguised as entertainment. The two sequels (Rama II and The Garden of the Rama) are much more into the people than the science and just don't work very well as fiction or science. There is also a new computer video game based on the Rama expedition, and there may be a movie in the works, too.

- W - L - - Stallion Gate / Martin Cruz Smith III,IV,V,X

The backdrop to this story is the Manhattan Project, as we follow the main character, a Native American Army sergeant, who is also J. Robert Oppenheimer's driver. Not only does this place us in the middle of the action, but he has legitimate reasons for getting all these people to explain what is going on to the rest of us. Stallion Gate was the location of the first atomic bomb test and nearly all the characters in this historical novel are real.

- W - L - - Warday / Whitley Strieber and James W. Kunetka I,III,V,VII
Not to be obsessed with nuclear weapons, but this story is written as if the two authors travel across America several years after a very limited nuclear war. Our culture is so dependent on high technology, yet few know how fragile these systems are. Very believable from both the scientific/technical and the sociological ends. (And I have always hated California, anyway...)

- W - L - - Nature's End / Whitley Strieber and James W. Kunetka I,III,V,VII,VIII

Although I personally think that Warday holds together better, this tale of what might happen to our ecosystem in our lifetime is too important to ignore. The scariest part is that the authors don't really end the story; indeed they cop out and literally invoke "magic" as a solution, which only makes it MORE depressing!

H W K L V - The Andromeda Strain / Michael Crichton I,III,V,IX

The first major sci-fi book I ever read, Crichton's gift as a writer is to blend fact and fiction so that you cannot tell what is true and what is story. (There really is a Jeremy Stone and all those publications of his listed are real.) A secret satellite falls out of orbit and the entire population of the town of Piedmont, Arizona is mysteriously wiped out. Well, almost everyone. Will the scientists understand what is going on in time? You'll just have to read the book (don't just rent the movie). Sci-fi, sure, but it is often mentioned when real plagues like Ebola are mentioned.

-W K L V R The Hunt for Red October

I,III,V,VIII,IX

-or- -W K L - R The Sum of All Fears / Tom Clancy

I,III,V,VIII,IX

Clancy is well-known as the writer of modern, fast paced, techno-thrillers that seem to know far too much about the workings of classified Defense Department equipment and the inner workers of the CIA and the intelligence committee. There is a lot of science and engineering detailed in these two books - a good read to take some of the mystery out of all that secret stuff. The Hunt for Red October involves the attempted defection of a brand new Soviet super sub; the United States is trying to help them defect while the USSR is trying to sink them. The movie, although entertaining, is much shallower than the novel, as is typical. The Sum of All Fears brings terrorist bombing to a new level, with the bad guys trying to nuke the Super Bowl. Some people like all the descriptions of the technology, but a certain amount of it can be skimmed or skipped if you want to get back to the story. Jack Ryan, who has been played in the movies by Alec Baldwin and Harrison Ford, is the main character in both stories.

H W K L - - Gateway / Frederick Pohl

III,V,AVII,VIII,X

There have been plenty of SF books about first contact with an alien race, but this one is nice because we are dealing with the artifacts of the alien race and never get to see the aliens (at least not in this book). There's a lot of good applications of physics and there is a kind of pioneering spirit that permeates the drama. Followed by a series of sequels, some of which are pretty good, but never recapture the innocence of this first one.

-W -L - - Footfall / Larry Niven and Jerry Pournelle

III,V,AVII,X

Dinosaur extinction may have been caused by a collision with a comet or an asteroid. Recently a 6,000,000 pound rock passed within 50,000 miles of the Earth and astronomers didn't even know it was there until three days after it past! But what if dropping rocks on the Earth was the prelude to an invasion?

- - - L - - Inherit The Stars / James P. Hogan

III,V,AVII

When Prof. Strickland, former chair of the GVSU Physics Dept., first brought this S.F. book to my attention, my first thought was my usual evil thoughts to S.F. book cover artists who don't have a clue when it comes to science. A mummy in a space suit on the Moon? Come on, it wouldn't happen. The dead astronaut would either be vacuum freeze-dried or an anaerobic slush of goo in a short time. Ah, but what if the guy in the space suit has been sitting dead on the Moon for 50,000 years before we had a space program? This forensic nightmare has a lot of neat things to think about (okay, so the ending is weak - that's true of a lot of books - read anything James Michener has written since about Centennial). There is a paperback version called Giants (?) which includes Inherit the Stars and two sequels. It is not excessively long.

- - - L - - The Two Faces of Tomorrow / James P. Hogan

III,V

If you watched any TV around New Year 1995, you probably ran into the network/MCI commercial with the strange English kid raving about digital information. The National Information Superhighway is coming. Internet is already here. WMU's computers are heavily networked. At what point does an information network have so many computers and connections that it no longer is "just a tool", but becomes self-aware? This is the problem faced in this SF story, where the government deliberately sets up a space station just in order to try to force the issue. The results don't quite match up with the expectations, which is pretty much what you'd expect. We tend to give all kinds of human emotions and attributes to computers, though any tendencies toward personality are strictly the result of programming. This story neatly discusses some of the stuff that computer science people have been batting around with Artificial Intelligence (A.I.) for years.

H - K L V - 2001: A Space Odyssey / Arthur C. Clarke

I,III,V,IX

In 1968, the year 2001 seemed so very far away. We were about to send Men To The Moon and American companies like Pan Am seemed invincible in the world market. Clarke wrote and rewrote this story over time (other versions can be found in the rare paperback The Lost Worlds of 2001 / Arthur C. Clarke) while Stanley Kubrick struggled to make this first super-realistic looking space movies. Douglas Trumbull and others, who eventually ended up forming Industrial Light and Magic to do special effects for Star Wars and every other big budget movie of the 70's, 80's and 90's, cut their teeth on this one. Still, the movie is no fast paced thriller - it is almost the first cerebral action movie. The book ended up being published before the movie was done, so the story is very different. But all the main characters are there: the early man-apes, the Monolith, our intrepid astronauts, and of course, HAL the computer. (Change each letter in HAL's name to the next one in the alphabet to get the joke.) People who fall asleep in the movie find the book exciting, which is a good thing considering that this is a book report not a movie review. A classic.

H W K L V - 2010: Odyssey 2 / Arthur C. Clarke

I,III,V,IX

Nothing worth doing once isn't worth doing twice, according to the popular culture gurus who have created Sequelmania. Years after Clarke had finished 2001, he got the bug to go back and expand the story and to try to bring the science up to date. The result is 2010 and it's a pretty good story - almost a violation of "Dr. Phil's Rule of Sequels". The movie is also excellent, starring Roy Scheider (now seen as the Captain of the SeaQuest) and offering those immortal twisted Russian aphorisms: "Easy as cake" and "It's a piece of pie", but once again, the movie and the book are different and (trust me on this one) Dr. Phil knows the difference.

H W K L V - Space / James Michener

I,III,IV,V,VIII

A giant epic saga of the NASA and the American space effort to land Men on the Moon, told as only James Michener can do. Actually, like so many Michener books, it starts off so well and covers so much, that the final direction of the storyline and the ending seem so, well, anemic. I maintain that Michener can't deal with today, only yesterday, and that therefore he can't write endings to his books.

-W K L - - The Mysterious Island / Jules Verne

III,V,VI,VIII,IX

The 1980's saw us watching the ever-resourceful McGuyver and his trusty Swiss Army Knife, think and work his way out of any scrape. But a hundred years earlier, fiction adventure books abounded where the hero(es) managed to survive and bring civilization on whatever deserted isle that happened to be shipwrecked on. In this tale, our intrepid heroes are Union supporters who manage to escape certain death at the hands of the Confederates by use of a stolen balloon, only to be swept away in a violent storm and balloon-wrecked on a remote volcanic island, who knows where. The "mysteries" of The Mysterious Island abound: where are they? How will they ever get home? And what unseen force is helping them survive? I first read this when I was 9, and I think that it strongly influenced my interests in dabbling in all manners of science, engineering and technology. I doubt that I would do as well as these hearty souls, but then they really did have a lot of help and a 19th century upbringing and no dependence on computer technology. The big difference between abridged and unabridged versions of the book, as noted in From the Earth to the Moon..., is much longer inventories and descriptions of things in the latter.

- - - - - Dune / Frank Herbert (1965)

I,III,VI,VII,VIII,X

This is a classic science fiction novel of an alien desert ecology, combined with all the galactic drama and interstellar politics you could ever want. A generation of science fiction readers grew up blown away by the scope and grandeur of this novel, which has achieved a stature almost like J.R.R. Tolkien's Lord of the Rings trilogy, especially since Dune was followed by numerous sequels. (The sequels are best enjoyed by those fascinated by the politics; otherwise, they suffer from the usual sequel problem of a loss of innocence from the first, wonderful book.)

- - - - - Ender's Game / Orson Scott Card

III,V

Ender Wiggins is a young boy sent into space to train to fight an alien race that might return and attack Earth again. In between some very interesting physics applications, Ender is subjected to the most unusual training and anecdotal agenda of his teachers. Card has a good track record writing science fiction about children and unusual coming-of-age stories. (His Songmaster is a beautiful story of music and galactic politics, of all things.) This is another perfectly wonderful science fiction book that has spawned a series of sequels, which are okay, but fail to capture the flavor of the first. I have debated putting this on the list for a long time, but recently a student suggested that I put this on the book list instead of the book he read which he hated.

-W -L - - Congo / Michael Crichton

I,III,V

One of the most popular books on the list, Congo is a nice mixture of science, technology and adventure in the deepest darkest and most mysterious parts of Africa. We tend to believe the rhetoric about the global village; in reality, there are vast stretches of the world (and our heritage) of which we know almost nothing. My favorite image is one of how they certify equipment as suitable for fieldwork... Congo was destined for even greater coverage during the summer of 1995 when the movie version came out, but... I doubt they could have filmed this a few years ago, but after Jurassic Park, they can do anything today -- except write a decent script. As for the movie, Michael Crichton was not involved in this production, unlike many of his others. Look for considerable shifting of the characters, probably to modernize and make more politically correct. As a result, the movie is lame, read the book.

- - - - - Fail Safe / Eugene Burdick and Harvey Wheeler (1962?)

I,III,V

- - - - - On the Beach / Nevil Shute (1957)

I,III,V

During the Cold War, the threat of nuclear extermination was something tangible and real. And books like Fail Safe and On the Beach were both terrifying nightmares and warnings that made people stop and think about what they were doing. It would be another twenty years before Nuclear Free Zones started showing up, during which NORAD would tunnel into Cheyenne Mountain in Colorado and the numbers of nuclear missiles and weapons would increase probably by a factor of ten.

- - - - - Timeline / Michael Crichton (1999)

I,III,V,II

Time travel stories are always problematic - there is no good scientific basis for supposing that time travel will ever be achievable, but it makes for good stories. Crichton has once again turned his talent at technological misdirection to quantum physics and time travel. And also to the technologies of 14th century France. You'll probably learn more about the past than the future in this novel, but then you never know.

----- Airframe / Michael Crichton (1996)
It almost seems unnecessary to have to add another Crichton novel to the booklist, but then not everything written by the author is actually suitable for this assignment. For example, Sphere and Disclosure are fun books, but they will not appear in this list – and for good reasons. But Airframe works very hard to give the reader some insight into the problems and triumphs of putting together some of the most complex machines ever built: commercial jetliners. As with Andromeda Strain, Disclosure and other Crichton stories, he has artificially collapsed the timeline so that there are unusual pressures on the protagonists, but that tends to help move the story along. For WMU PHYS-102 students, this is a nice example of systems interactions at work; for WMU PHYS-107 students, you'll see a lot of the physics principles that we've worked on all semester come into play here. A fast read, and maybe educational, too.

• **Alternative Realities (Science Fiction and Fantasy)**-----

----- Harry Potter (I, II and III) / J.K. Rowling (1997,1998,1999) I,III,V,VI
Talk about bestsellers! To get these three books off of the New York Times Fiction List, they changed the rules to dump them onto a new "Children's List". But despite motivating millions of kids to suddenly start reading books, a lot of adults are reading Harry Potter, too. So, is there anything scientific about Harry Potter? Well, there's magic, and how magic is used, the rules it follows, the morality and ethics of using them. Sounds like an analogy to me! Just so you don't get off "easy", you will be required to read the first three Harry Potter books. Read just one, and you'll face a 75,000 point deduction. Page count is 7 pages, two pages per book, plus one for intro/summation. If you've already read the first three Harry Potters, read Harry Potter IV and discuss the whole series in 8-9 pages. Upset that you have to read or write so much? Pick a book for grown-ups off the list!

--- L - - The Difference Engine / William Gibson and Bruce Sterling III, V, VI, VII, VIII, IX, X
I debated about putting this book on the list for two years. This is sort of reverse engineered science fiction. Charles Babbage worked on making mechanical computing devices. His greatest effort, the Difference Engine, was never finished, and although he is often credited with creating the first computer, in fact it didn't really work at the time. -- But what if it had? What if Victorian English engineers had not just the power of iron, steel and steam, but of the Difference Engine? Victorian engineers have always intrigued me: they seriously believed that they could build anything, but they were also so arrogant to assume Man's superiority in all things in this world, so they didn't give a damn about the consequences of their actions. (You want the complete Dr. Phil Existential Gestalt Experience? Compare and contrast the social impact of computer technology in this book and in the movie Until The End Of The World.) Gibson and Sterling's creations do all that and more. This book is very accurately Victorian, which means that it is written in a crowded gingerbread style that seems somewhat alien until you get used to it, and it is in no way politically correct. Reader discretion is advised.

--- L - - Neuromancer / William Gibson -or- --- L - - Islands in the Net / Bruce Sterling III, V, VI, VII, VIII, X
I spent the summer of 1994 reading maybe eight or nine "cyberpunk" novels, a genre of science fiction that deals with computers, hackers, information and how society will hold together with the promise and fall apart with some of the weight of all that high technology. If you ever saw the Harrison Ford movie Bladerunner, then you've seen some of the dark film noir quality that the cyberpunk movement has introduced into SF. These two guys wrote The Difference Engine, listed earlier. Neuromancer, which has several sequels (and some short story prequels in Crystal Express and others), is kind of about hacker "cowboys" riding the wild range of cyberspace and generally poking their noses into places those big, evil, impersonal corporations would rather one didn't poke. Very much run like an action adventure movie and great fun; it's hard to keep score as to who the good/bad guys are. The recent movie Johnny Mnemonic, is from a Gibson short story of the same name (included in a collection titled Burning Chrome), and is from the same series as Neuromancer. Islands in the Net, on the other hand, rings much closer to a possible future. While there is a sort of adventure mystery to justify having a story, part of the interest in this book is the kind of New Age/healthy lifestyle slash global corporations slash Amway/entrepreneur slash liberal/socialist/good neighbor business system of our self-righteous heroine of the novel. If you read some of the history of computer books about Apple, Microsoft and the California and Seattle high tech business climate, Sterling's vision clearly springs from the same ideals. (What I can't figure out is whether Sterling believes or whether he's making fun of it.)

----- Grass / Sheri S. Tepper III, V, VI, VII, VIII, X
Grass is a planet whose ecology is based on, well, grass. Hundreds of different kinds, colors, textures, flavors, etc. And the human colony also deals with the native animals in mimicry of an old style English fox hunt -- and this is where the mystery begins. I put it in this section, rather than under regular Science Fiction, because, well, it's a strange book and while I liked it, I know some people have had some weird reactions to it. (We own a copy because a friend of ours was too weirded out by it to keep it in her house!)

H - - - - Time and Again / Jack Finney III, V, VI, VIII
Time travel has fascinated science fiction writers for a long time. Imagine going back and see what really happened. Jack Finney's What-if story uses an ingenious concept for time travel: that we are trapped in our own time by all the little details of modern life that surround us. Live and breathe the details of another era, and you might find yourself back in New York City in the 1880's. Definitely one of the "Gee, I wish this was true" stories, I've included this on the list because it really highlights the technology of a century ago, which in turn puts a real perspective on where we

are today. (There is a sequel, From Time to Time, that was written some twenty years later. As is typical of sequels, it doesn't have quite the innocence of the first book, but it is really enjoyable and has some really excellent twists in its plotline. I wouldn't recommend that you read the second without reading the first, though.) Rumor has it that Time and Again may be made into a movie; something that couldn't have been done well with movie making technology even just a few years ago.

----- Pastwatch: The Redemption of Christopher Columbus / Orson Scott Card (1996)
III, IV, VI, VII, VIII

As has been noted earlier, time travel is definitely an odd sub-genre of science fiction. We can imagine traveling to other stars, even if it really might take extraordinary time and measures, but how... is it, will it, could it be possible that we might travel in time. The SF author doesn't worry about such little details. The fun in time travel stories is the potential for the unusual juxtaposition of events or the paradox of interfering with the past. In Card's story, Columbus is identified as being a nexus in history – because of his success in crossing the Atlantic, he brought untold misery to millions of people, native peoples wiped out or conquered and displaced, slaves brought in as a cheap labor source. (This is sort of the modern revisionist view, which showed up in the movie 1492: The Conquest of Paradise, among other places.) So... what if you could change what happened? Would you do it? Would you do it even though you know that it would change everything in your own time? That the era and the peoples that live everywhere would suddenly cease to exist and a whole new history would unfold from the time of your meddling. And you thought that it was tough deciding where our garbage should be disposed of!

----- World War: In the Balance / Harry Turtledove (1994) III, IV, V, VII, VIII, IX
So here we are, the Americans and the Brits and the French and the Soviets, happily fighting the Nazis, the Italians, the Japs – it's just WW II as we always knew it. Until the aliens attack. Now, just typing this stuff seems ludicrous, and it is a topic that is included in other booklist books (Foafall or just other unexpected alien encounters such as Inherit the Stars, Rendezvous with Rama). But what Turtledove is noted for is the breadth of detail and story. His earlier work, The Guns of the South, postulates what would have happened if General Lee's Confederate Army had been equipped with AK-47 automatic rifles. Again, it all sounds crazy. But... if you really want to understand technology and how it impacts on our lives, sometimes it is important to take that technology and either remove it entirely (hmm, there's a neat book that seems to be missing from this version of the booklist) or place it in a different context. Often that is a real value of SF writing. This book is the beginning of a massive series that is now four books long and I don't really think it's done yet.

----- The Hammer and the Cross / Harry Harrison (1993) III, IV, VI, VII, VIII
Despite what you read about King Arthur, modern England really was established in 1066. But what if the Battle of Hastings had happened in 866? And the Vikings had won? This is the beginning of a series of books (One King's Way and King and Emperor continue the story) that put a very different view of history, the Renaissance and the use of science and technology. Although the book suffers from a "I can't believe that they could do all this in two years" problem common to many SF stories, it is interesting conjecture to collapse the history of metallurgy into a short time, going from iron works, to steel, to case hardened steel, and the consequences of having such advances. If you saw the Summer 1999 movie The 13th Warrior, you might be interested in this book as a way of learning more about the early technologies of steel and what was going on in 922 A.D.

• **Computers**-----
- W - L V - The Electronic Sweat Shop / Barbara Garson II, IV, V
What started out as just a study of how computers are used in the workplace, turns into a fascinating and somewhat depressing account of how big business and government mis-use computers to create the modern electronic equivalent of the old sweatshop. Very insightful to see how McDonalds, social services, airline reservation systems and many other corporate computer systems really work. Everyone talks about office automation as if there are great savings (sounds like all those bad AT&T and MCI commercials!) to do the job by computer, but in reality companies computerize for very different reasons.

H W K L V R The Soul of a New Machine / Tracy Kidder I, II, IV, V, IX
Another New York Times best-seller, Kidder is just a good writer who tags along with a crowd of computer designers at Data General in the early 80's and watches them create a new minicomputer. The tension is palpable and the company's future is riding on the success (or failure) of their efforts, in the face of the stunning competition from Digital Equipment Corporation and their new computer: the first VAX. (The VAX's that WMU uses for student computer accounts have come a long way from that very first VAX-11/750 of 1979, a machine I was very familiar with, that might be best described as looking like a high tech washer and dryer pair, with its associated disk drives.) You might want to check out the December 2000 issue of Wired magazine – they have an article about where Tom West, the Hardy Boys and the Microkids (the people in this book) are today.

H W K L V R The Cuckoo's Egg: Tracking a Spy Through the Maze of Computer Espionage / Clifford Stoll II,II,IV,V
A fascinating tale of life on Internet, the international computer academic/educational/research network, that develops into a real spy story. Lots of explanations, but plenty of good technical stuff as Stoll does his detective work to find out who is breaking into his computers! (AND those of the U.S. military.) Hope College, GVSU, WMU, KVCC and most other colleges are connected to the Internet - in theory you could get a computer account and be a part of all this. PBS' Nova did an episode based on this story. Includes a great cookie recipe.

----- High-Tech Heretic: Reflections of a Computer Contrarian / Clifford Stoll II,IV,V
When a school shows Stoll the fancy new technology computer classroom they've installed, his first question is not how many megahertz, but what was the room used for before?

--- - V R Accidental Empires: How the Boys of Silicon Valley Make Their Millions. Battle Foreign Competition, and Still Can't Get a Date / Robert X. Cringely. II,IV,V,IX
There are some wonderful stories about the computer industry in this book. Having gone to school with geeks and nerds like me, the title alone is worth the price of admission. Bob Cringely turned this work into a three-part, two-and-a-half hour PBS special this year: Triumph of the Nerds: How the Personal Computer Changed the World.

- W K L V - The Hacker Crackdown: Law and Disorder on the Electronic Frontier / Bruce Sterling II,IV,V,VIII,IX
Clifford Stoll's The Cuckoo's Egg contains many complaints that the FBI and other government agencies aren't involved enough in dealing with computer crime. Well, here we have the Feds storming in and breaking things up; the problem seems to be that (a) they are going after the wrong people and (b) they haven't a clue in understanding what all this computer technology is good for. (One agent wants to impound some audio CD's until another agent convinces him that you really can't do any computing with Michael Jackson music.)

- W - L - - Hard Drive: Bill Gates and the Making of the Microsoft Empire / James Wallace II,IV,V,VIII
This book is about Bill Gates, the young, multi-billionaire chairman of software megafirm Microsoft. It is both a biography of the man and a history of the microcomputer revolution. Sometimes it is hard to remember that the Macintosh came out in 1984, the IBM Personal Computer debuted in 1981 and even the venerable Apple II computer only dates back to about 1977 or '78. Lots of firms have come and gone, to say nothing of countless leading edge computers and programs, but Microsoft has been there from the beginning and despite the thousands of employees, Bill Gates' vision is still the law in Redmond, WA. But this is no glassy-eyed corporate P.R. piece; I think that it deals very fairly with the brilliant and infamous reputations of both Chairman Bill and his company. As a result, methinks that Bill Gates will hate this book. By the way, Gates is now writing a column that the Detroit Free Press is running and you can send e-mail to him (or his minions) on computer issues at: askbill@microsoft.com .

- W - L - - Insanely Great: The Life and Time of Macintosh, the Computer That Changed Everything / Stephen Levy II,IV,V,VIII
The title refers to Steven Jobs' cheerleading term for the vision that became the Apple Macintosh computer. This book about the history of the Macintosh was written by a rabid Macaholic, so there are plenty of not very objective statements about how wonderful the Mac and how awful everything else is, and he clearly doesn't always know what he is talking about. Still, given the success of both the Macintosh and Microsoft Windows, it is very interesting to see where all this stuff comes from and how our ideas of what a computer is or should do have changed. It makes you really wonder about the people over at Xerox, who never exploited the tremendous stuff that was developed at their very own Palo Alto Research Center (Xerox PARC). (And in the 1940's, IBM once estimated that they could only envision a worldwide market for maybe ten computers.)

----- Code: The Hidden Language of Computer Hardware and Software / Charles Petzold (2000) II,IV,V,IX
This is a book about how computers work, but it is not your usual sort of "how computers work" book. It is especially noteworthy not only because of the praise that reviewers are heaping on this title, but because the publisher is Microsoft Press. If you think that this is some Bill Gates promotional piece, though, you'd be quite wrong. Microsoft is first mentioned on page 102, and then only in a humorous comment that someday people might think that "logic gates" were somehow named after The Billster. And Windows isn't even mentioned until page 334, just two pages after MS-DOS is mentioned. Who should read this book? I think everyone is eligible. Computer geeks and EE's may know some of this, but I daresay there is much more detail than they've ever seen. And it was my wife the librarian who pounced on this book at Schuler's Books & Music, not Dr. Phil. It sometimes looks intimidating, with diagrams and tables of numbers, but if you start at the beginning you will see that the author has laid out his story beautifully. And since Dr. Phil tells a storytelling approach to Physics, you can imagine his delight with Code.

----- Visions of Technology: A Century of Vital Debate About Machines, Systems and the Human World / edited by Richard Rhodes (1999) II,IV,V,IX,X

Richard Rhodes' The Making of the Atomic Bomb gets high praise earlier in the booklist. This book is not about Rhodes' writing, but the collecting of dozens of writings of others, written in a different time than ours. Hindsight is a powerful visionary - reflection is revealing. This would not be an easy paper. If you just start citing a list of topics or comments, you'll have missed the whole point. The goal of this book is to see the bigger picture. What is Rhodes trying to put together with this collection of items? What does it say about the 20th Century? The 21st Century? Us?

----- Bootstrapping: Douglas Engelbart, Coevolution, and the Origins of Personal Computing / Thierry Bardini II,IV,V
PC's are so commonplace today, that it is hard to imagine life without them. But not only was there a time (not all that long ago) that there weren't PC's or the Internet or Windows, someone had to come up with the "idea" of the PC, the Internet or Windows, and someone had to figure out how we would use them. Bardini feels that Douglas Engelbart and the story of his Augmentation Research Center at the Stanford Research Institute has been neglected. We're not talking about bragging or patent rights here - we're talking again about that vision thing.

• **Math and Science**-----
H W K L - R Consider a Spherical Cow / John Harte II
Sometimes estimates are more useful (or a better use of time) than calculating things exactly. This book is about the art of the "back of the envelope" calculation, like figuring out how many rabbits live in the desert based solely on the number of roadkills you pass. You may feel that there is more math in here than Harte lets on, but again, you should be able to skim the tough bits and still follow the threads of the arguments.

H W K L V R Innumeracy: Mathematical Illiteracy and Its Consequences / John Allen Paulos II,VIII
First this was illiteracy, then Cultural Illiteracy. Now the big topics in education are math illiteracy, science illiteracy and computer illiteracy. You don't have to be a mathematician to appreciate some of what this book talks about, and all of us probably can see ourselves in one of his examples. The author of several books on math and the public, John Allen Paulos also writes columns for several magazines and has a sequel to this book called Beyond Innumeracy.

H - K L V - From One to Zero: A Universal History of Numbers / Georges Ifrah II,VIII
This is an archaeological tour through early cultures, their writing and their mathematics. You don't have numbers unless you have some purpose, something for them to do!

H W K L V - Chaos: Making a New Science / James Gleick II,VIII,IX
Every science generation has a sexy new topic or two that seems to solve every problem. Fractals were real big a few years ago and now it is Chaos theory. For most of us, it doesn't seem surprising that chaos based control a lot of problems in Nature, after all, our lives seem pretty much chaotic! But it has been really tough for a lot of scientists to accept Chaos theory, because they grew up believing in the powerful Physics developed by Galileo, Newton, etc., which seemed to make the Universe run on clockwork and precise equations. On the other hand, if this works...

- - **K L V -** Natural Acts: A Sidelong View of Science and Nature / David Quammen II,IV
Fun stories of biodiversity, science and scientists: water, cockroaches, The End of Life, The Beginning of Life, snorkeling in Montana and a man with a metal nose.

- **W K L - -** The Dinosaur Heresies: New Theories Unlocking the Mystery of the Dinosaurs and Their Extinction / Robert T. Bakker II,IV
I've always liked Bob Bakker: he's animated and enthusiastic, has a big shaggy beard, always wears a hat and is not a thin person. Bakker, whose work was not only critical to the making of the movie Jurassic Park, but was sort of the prototype for Alan Grant and shows up in the video game version of Jurassic Park, is another of several dinosaur experts that have been upsetting the old ideas of dinosaurs as slow, plodding, cold blooded (literally and figuratively) reptiles. And since there are no dinosaurs today, everyone has got a theory on why they are extinct. Bakker was at WMU in the Fall of 1995 and Battle Creek in 1994; if you ever have a chance to catch his "act", do so, especially if you have kids. A very engaging and enthusiastic speaker.

- **W K L - -** The Mismeasure of Man / by Stephen Jay Gould II,IV,VIII
When I mention this booklist to other faculty, one of the names that comes up a lot is Stephen Jay Gould. I've heard Gould speak several times, at WMU last fall and also at Michigan Tech, and he is a very interesting person. There are certainly other selections, but I thought that these two titles would complement the current reading list. With all the controversy in the fall of 1995 about the book The Bell Curve, a certain amount of attention was brought to bear on the ideas of IQ and general intelligence (called "g") and how they are tested for. Gould treads a fair line in his award winning The Mismeasure of Man of a decade ago, in recounting the history of intelligence testing and the desire to turn Psychology into a science like Physics, mostly trying to point out that these men were doing science as it was done in those days. The Bell Curve authors, of course, fail to see this attempt at fair play, and Murray tries to

skewer Gould's book and its unflattering portrayal of general intelligence testing as inaccurate, which of course is what you would expect them to say.

----- Darwin's Black Box: The Biochemical Challenge to Evolution / Michael J. Behe (1996)

II,IV,V,VIII,IX

Christmas 1996 brought two good books to my booklist. This one came from my father-in-law, a newly retired biology professor, came with a note "To Keep Us Honest". Hmm... wonder where he stands on the issue of evolution? The book jacket suggests that Behe... "is not a creationist. He believes in the scientific method, and he does not look to religious dogma for answers to these questions. But he argues persuasively that biochemical machines must have been designed – either by God, or by some other higher intelligence." Now, I'm a physicist, not a biologist, but I do know that there's a great deal of debate, and even more "non-debate" about Darwin and evolution, where science and faith are played as adversaries in an either/or game. Well, if you don't like the game, change the rules. Seems to me that there's room for a tertium quid (the third way). Perhaps Behe's work points in this direction. The fly in the ointment seems to be Behe's key argument. (Don't be swayed by his constant refrain quoting Darwin himself – you'll know what I mean. It isn't actually a valid point the way he uses it.) Behe argues that if something is irreducibly complex that it therefore proves Darwin false. Unfortunately, there is a subtle logical error in this that is easily lost – especially if you want to believe. Dr. Phil would be happy to point this out to you.

H W K L - - Wonderful Life: the Burgess Shale and Nature of History / Stephen Jay Gould II,IV,VIII

Take a walk down the corridors of WMU's Rood Hall toward the southeast corner of the first floor and you'll see Michelle VandyBogurt's display case on the Burgess Shale – hmm, wonder if it's still there. Anyway... As if evolution isn't controversial enough in some circles, Gould uses the explosion of diversity and families of arthropods that thrived in abundance and then were never seen beyond the time of the Burgess Shale fossils, as evidence that we shouldn't think of evolution as described in the familiar model of the spreading tree or the (in)famous lineup of ape to Man. Making scientific sense of the fossil record is not easy, and is typical of books in this booklist, you can bet that personalities and history play a part in this story. Watch out for the three weird beasts, originally described in the Burgess Shale, that turned out in later research to be parts of the same creature!

----- Indistinguishable from Magic: Speculations and Visions of the Future / Robert L. Forward (1995)

II,V,VI,VIII,IX

Science fact and science fiction have been intertwined for a long time. Lots of SF stories start out as one-trick exercises to showcase some new technology or show-off some new quirk revealed by science and technology. Futurists also use SF as a way of seeing how the future might be put together. Forward has looked into many new technologies over the years and has tried to put together a reasonable way to implement it. Not that some of these are easy, mind you, but as long as we're going to have starships zinging through the universe, you might as well speculate how one might actually do such a thing. And that's Dr. Forward, physicist, to you. He's a member of the American Physical Society, Sigma Xi, etc. The title, by the way, is from a line by Arthur C. Clarke, himself a famed SF author and futurist: "Clarke's Third Law: Any sufficiently advanced technology is indistinguishable from magic" – from his Profiles of the Future.

----- The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory / Brian Greene (1999) II,IX

My wife ran across this book and enjoyed it so much she passed it on to her old Astronomy professor from college. This is Modern Physics explained for both scientists and non-scientists.

----- Just Six Numbers: The Deep Forces That Shape The Universe / Martin Rees (1999/2000)

II,VIII,IX

This may be one of the shortest books in the booklist, but it is very long in depth and information. Rees takes a look at six astrophysical constants, numbers that essentially define our Universe and its suitability for us to live in it. In Physics class we tend to just simply accept our physical constants such as g , G , c , e , k , h , etc., without thinking about the consequences of these values. And although the Universe is $H U G E$, it can be very difficult to measure, perched as we are on one small planet orbiting a minor star in the midst of a terribly ordinary galaxy. So of the six numbers (N , ϵ , Ω , λ , Q , D), some are not known well, but all have meaning.

• **Technology and the Environment**-----

--- L - - Nuclear Culture: Living and Working in the World's Largest Atomic Complex / Paul Loeb II,IV,V,VIII

Los Alamos and Oak Ridge are probably the most famous of the WW II Manhattan Project sites. But Hanford, Washington is where the big legacy of atomic construction (and atomic leftovers) remains. This is not a story of nuclear weapons and nuclear power, so much as a sociological look at the boomtown that grew up on the banks of the Columbia River.

- W - L - - Much Depends on Dinner: The Extraordinary History and Mythology, Allure and Obsessions, Perils and Taboos / Margaret Visser II,IV,V,VI,VIII

A real stretch here, but there's still a lot of science in both food preparation, and the technological changes which were required by or the result of, new foods. Most of us live in such isolation from where our food comes from, that

this book serves as a useful reminder that we are what we eat. Forty years ago, most of what we buy in the stores today as packaged or prepared foods did not exist, and most people had at least a good idea of where food came from, even if they didn't know the history of it. This has been a surprisingly popular book for this assignment.

- W K L V - Rubbish! The Archaeology of Garbage / William Rathje and Cullan Murphy II,V

If you have any interest in recycling, the environment - or the other side of the coin, with the production and distribution of consumer goods, this book will open your eyes to what happens after stuff is thrown out. Why aren't our landfills stuffed with sofas and major appliances? (They are shipped and sold to the developing countries who need them more than they worry about brand names or newness. - In other words, they are REALLY recycled.)

- W - L V - The Beaches Are Moving: The Drowning of America's Shoreline / Wallace Kaufman II,V

A nice book that tries to explain that shoreline and property lines just don't mix, while we keep on assuming that Mother Nature will respect our manmade boundaries. Or the mistaken belief that putting up one breakwater won't have affect anything and change the erosion pattern elsewhere.

H W K L V - Missile Envoy: The Arms Race and Nuclear War / Helen Caldicott II,IV,V,IX

If you are looking for a balanced view of the pros and cons of the atomic age - this ain't it. Dr. Caldicott became incensed with the numbers and horrors of atomic weapons and gave up a rewarding medical practice in order to combat them. Still, there are many good arguments and discussions in this critical look at the real and projected costs of the arms race and questionable arguments that have supported it. For example, during the Missile Gap crisis in the early 1960's, the Soviets actually only had four working missiles. (The CIA was really embarrassed when they found this out!)

----- Cadillac Desert / Marc Peter Reisner (1986)

Listed as 61st of top 100 most notable non-fiction English works, about the problems of water use out West.

• **Technology and Engineering** -----

H - - - - - Normal Accidents: Living With High-Risk Technologies / Charles Perrow (1984) II,IV,V

You can find some fun books in the \$1.95 sale racks. Disasters are such an instructive way to talk about technology and how our society and media react to it, that I sometimes have library assignments and papers on the topic. No science is particularly good or evil. Furthermore, no matter how hard we try, accidents can and will happen. And when we become complacent, as humans are wont to do as long as things are working just fine, we don't try as hard. Perrow talks about why Three Mile Island type events have been rare before, but why they might become more common. Government, industry and insurance people are always like to quote statistics and probabilities about dam failures, the Exxon Valdez, etc., etc. But people aren't numbers. And someone in the field has to be putting those numbers together (and presumably going home happily and getting a good night's sleep after a day of defining what are to be considered "acceptable losses"). There's a certain amount of jargon, acronyms, and numbers, yet from my point of view Perrow is a storyteller and these are stories you should here. It is both scary and comforting; consider that as I write this, teams of investigators are still investigating the crash of the TWA 747 off of Long Island, doing their jobs and slowly putting all the pieces together in order to try to determine what happened. It's not a lot of comfort to the souls lost on that flight, but we will learn. Until the next time, of course.

- - L V - Flying Buttresses, Entropy and O-rings: The World of an Engineer / James L. Adams II,IV,V

Engineering is a very broad and misunderstood field, and engineers are a very misunderstood breed of people. So it's nice to see a mechanical engineer who can write take the time to tell some stories and give the readers some insight into what engineering and being an engineer is all about. I mention that Adams is an M.E., because although you don't need a big science/engineering background to read this book, you may find that many of his topics are familiar stuff from your introductory physics course.

- - K L V - Star Warriors: A Penetrating Look Into The Lives of The Young Scientists Behind Our Space Age, Weaponry / William Broad II,IV,V,IX

A look at the pro-SDI culture at the Lawrence Livermore National Laboratory. Edward Teller, their fearless leader and father of the American H-Bomb, personally sold President Reagan on the merits of the Strategic Defense Initiative, even as the American Physical Society and other scientific organizations said it couldn't work.

H - - L V - Why Buildings Fall Down: How Structures Fail / Matthys Levy and Mario Salvadori II,V

There are thousand year old structures that are still standing today while some pretty expensive modern real estate falls right down. Forget the lawyers and the lawsuits, these books look at the "why" of structural engineering, past and present. There is, by the way, another book entitled Why Buildings Stand Up (- W K L - -).

----- To Engineer is Human: The Role of Failure in Successful Design / Henry Petroski II,IV,V

Technology is not a new invention of the 1990's; a great deal of engineering design work was done long before computers were around. Good design involves many skills and quite a few mistakes along the way. Brittle fracture, the cooking of steel (the recipe for austenitic stainless steel is included; serves 4000), bridge collapses, etc.

----- The New Science of Strong Materials: or Why You Don't Fall Through the Floor / J. E. Gordon II,IV,V
For those who want a more technical treatment than Petroski's To Engineer is Human, this book offers a good discussion of why some materials are stronger or more brittle than others. In case the word "technical" should scare you, I should point out that anyone who has completed PHY-220 or -230 (GVSU), PHYS-113 or -205 (WMU), or Physics 105 or 121 (Hope College), should be able to deal with the issues of science and technology involved here.

----- Skunk Works: A Personal Memoir of My Years at Lockheed / Ben R. Rich and Leo Janos (1994) II,IV,V
Clarence "Kelly" Johnson is one of the great technological giants of the 20th century. His Lockheed "Skunk Works" produced a series of triumphs some of which are still probably completely classified. The magic here was an ability to work with a clean sheet of paper and engineer what had been thought to be impossible. Need a spy plane? The same special group produced the U-2 and the SR-71, the former a subsonic powered sailplane and the latter the undisputed world record holder for speed and performance, blasting through near space in excess of Mach 3. Ben Rich, in some sense, inherited the Skunk Works, and among other things, shepherded another impossible plane, the F-117A Stealth Fighter, into the world. There's certainly a lot of the self-congratulatory in this book (Janos helped Chuck Yeager write his autobiography, so the style is familiar), but there's still enough technological fodder for this assignment, made all the more remarkable because it is all true.

----- The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's On-Line Pioneers / Tom Standage (1998) II,IV,V,VI
Dr. Phil has been using computers since 1976, had e-mail since 1984, and remembers ARPANET and BITNET, long before there was this thing called the Internet. The explosion of the Internet and the Web has been touted as being unique in the history of Man and technology. But is it? Right from the start, Standage's argument really hits a chord, as one considers how the telegraph changed everything seemingly overnight in the nineteenth century.

----- Nothing Like It In The World: The Men Who Built the Transcontinental Railroad 1863-1869 / Stephen E. Ambrose (2000) I,II,IV,VI,IX
Promontory Point, Utah, May 10, 1869. A time and place that both defined a moment in history and changed the United States of America forever. The event was the laying of the Golden Spike to complete the joining of the Union Pacific Railroad from the Midwest with the Central Pacific Railroad from California. Reliable, fast communication and transportation from Atlantic to Pacific was now a reality. But how did such a project get started in the middle of the Civil War? We so often think that everything was at a standstill during the great wars, but that isn't exactly true. Nothing Like It In The World is a story of politics, history and a spectacular construction project – one of the great engineering feats of the 19th Century. Historian Ambrose is most recently noted for his work on WW II and the National D-Day Museum, work that Tom Hanks and Stephen Spielberg (Saving Private Ryan) have been trying to bring to the public's eye. Thirty years ago I read Pierre Berton's wonderful The National Dream about the construction of the Canadian Pacific Railroad, which is Canada's transcontinental railroad story. Thankfully, in my lifetime, I have the pleasure of reading a similar epic about the American transcontinental railroad.

• **Medicine (Fact and Fiction)**-----
- **W K L V** - Five Patients: The Hospital Explained / Michael Crichton II,IV,V,VI,VIII
Crichton followed his wildly successful Andromeda Strain novel with this non-fiction book of, you guessed it, five patients admitted to Massachusetts General Hospital. He discusses not just the immediate medical history of the cases, but the history of the medicine that goes into the treatment. When I suggested this to someone in Fall of 1993, it occurred to me that one of the most intriguing aspects of reading this book for this assignment is that there is a nearly twenty-five year gap between then and today, especially considering the improvements in modern, high tech computerized medicine as both bane and boon for health care in the '90's. Very popular with health science majors in 1994, so be warned that I've read a lot of these papers.

H - - - - The Terminal Man / Michael Crichton (1970) I,III,V
After the triumph of The Andromeda Strain and the publishing of the non-fiction Five Patients, Crichton produced this cynical fictional story of uncaring doctors forging ahead with a research project to help epileptic patients control their seizures with electrodes in their brains (or plugged in like a computer terminal, hence the title). Sci-fi for twenty five years ago, but not today. This story is as much about ethics as it is about the leading edge of science. If anything, the movie version is even more Crichton's statement on the inhumanity of the medical profession he had trained for and then abandoned because he couldn't be the uncaring tyrant that he felt they were trying to make him. Of course, it doesn't hurt to be able to write best-sellers and wildly successful movie screenplays and demands of Hollywood regarding creative controls. His TV show ER may not portray medicine in the best of lights, but at least the show is populated with human beings.

- **W - L - -** A Case of Need / Jeffrey Hudson (Michael Crichton) I,III,X
This is one of the books that Michael Crichton wrote while he was in Harvard Medical School, to help pay the bills. The company that had the paperback rights to Hudson's book, has since plastered Crichton's name all over it and has made a great deal of money since Crichton's last 3 movies have come out (Jurassic Park, Rising Sun and Disclosure, and I suppose we must include Twister now), which has made Crichton very angry. I put this book here, not to be inflammatory (the story involves the death of a young woman and a pre-Roe v Wade illegal abortion), but

because young Dr. Crichton was able to weave a convoluted tale about a pathologist trying to solve a murder with the usual Crichton attention to description and history. A mystery book club that meets at Grand Valley State University used this book recently, and one of our discussion threads focused on the old TV show Quincy, which was always a lot of fun, but tended to be somewhat rote, formulaic, preachy and everything worked out in the end. This book is like Quincy, but grown up. It is dated and from the somewhat polarized papers I have received, clearly "Mr. Hudson" has some agenda here, even if it is just informational. (I personally think that the book was written to be controversial and make enough money to pay the bills.) I'm sure I've seen a TV movie based on this work, but I haven't seen a reference yet. Recommended, but with reservations.

- **W - L - -** The Hot Zone / Richard Preston I,II,IV,V,X
Robin Cook's novel Outbreak and a blockbuster movie of the same name (not by Robin Cook) were big news in the summer of 1995; both have an exciting story of the spreading of a plague and the attempts to top it. Michael Crichton's Andromeda Strain also spins a yarn about scientists rushing to prevent the spread of a deadly organism. Great stuff, both of them, and very entertaining. Part of the entertainment value comes from the very believable portrayal of science and government in those fictional works. But what's the real scoop about how well we are prepared to face a super plague? Well, The Hot Zone is not fiction. It's about a real outbreak of a real disease in the United States (the actual Library of Congress subject headings: **Ebola virus disease--Africa and Ebola virus disease--Virginia--Reston**) and the efforts to identify and stop the spread. Although The Hot Zone apparently provided the inspiration for Outbreak, Preston claims that we are not nearly as well prepared as the fictional accounts would have you believe. NOTE: The graphic (sensationalized?) descriptions of what hemorrhagic fevers do to the living are not for the squeamish.

H - - - - The Coming Plague / Laurie Garrett II,IV,V,IX
No sooner had I put the Ebola book The Hot Zone on the Spring/Summer 1995 booklist, gone to see the Ebola movie Outbreak, and read Robin Cook's unrelated Ebola novel Outbreak, when Ebola was suddenly front page news again in Zaire. The Coming Plague is "The Making of the Atomic Bomb" for Man's attempt to control the horrible and mysterious tropical diseases of the world, including Ebola Zaire. Why put all these disease books on the list? Because the West tends to have this attitude that we are invincible and invulnerable with our high technology. And Garrett is someone who knows what she is talking about, not just a writer. (As with The Making of the Atomic Bomb, you need not finish this 750 page in order to write a meaningful paper.)

----- Carriers / Patrick Lynch (1995) III,V
You've probably noticed that this booklist has themes. No, this book isn't about naval air technology, it's a novel about a really bad disease. If you've read any of the real Ebola books, The Hot Zone or Ebola: A Documentary Novel of Its First Explosion, you might wonder why one needs to include a science fiction work about "a bug one hundred times more contagious than Ebola", as USA Today says. After all, isn't The Andromeda Strain the ultimate SF disease book? Well, the science literacy point of all these books is get people to think. In a world with rapid travel, modern medicine and other gifts of high technology, we would be wise to consider that our position is not without risk. More than one technological crisis has reminded us, for at least a brief time, of our hubris, but we in the United States have managed to escape much of the worst possibilities. Actually, this is a pretty good book, revolving around some excellent technical issues about biochemistry and raising a lot of terrific issues about government, corporate and foreign responsibilities and control measures, and laid out in a rapid can't-put-it-down style.

----- Ebola: A Documentary Novel of Its First Explosion / William T. Close, M.D. II,III,IV,V
Enough with the deadly Ebola virus books, okay Dr. Phil? Well, after having done a couple already, I should really include this book, which fits into a funny category. (1) It is a historical novel of the first outbreaks of Ebola, and so humanizes the people. (2) It is written by someone who was around in the aftermath. (3) We are likely to see a movie of this one made, because Dr. Close is the father of the actress Glenn Close, who wants to play one of the Belgian nuns. (4) This is not some quick-and-dirty get rich on the Ebola scare book, but originally written in Flemish back in 1991 (Yambuku: The Story of the Ebola Virus), to tell the story of the nuns at the mission hospital to the people back home, and now translated into English.

H - - - - The Road to Wellsville / T. Coraghessan Boyle (1993) III,IV,V,II,X
This is one odd book. It is hard to decide whether it is comedy or history, real or fiction. In the end, it is a fascinating look into a piece of Michigan's past, at the great Dr. Kellogg, the Battle Creek Sanitarium, breakfast cereal, and the whole Victorian upper class' obsession with excess. There is a movie, but there's so much more to the show in the book. You'll never look at another diet plan or special food in the same way again. Science? My dear sir or madam, this is all in the name of Science!

- - - - - The Body Farm / Patricia Cornwall (199x) I,III,V,X
-or- - - - - Déjà Dead / Kathy Reichs (1997) I,III,V
"You are about to enter the fascinating world of forensic medicine." Thus began every episode of the TV show Quincy. In fact this is a rather fascinating world, and millions of mystery readers enjoy the hunt for clues and details as much from the forensic investigators as the police and detectives. Here are two science literacy tours from the dark, convoluted world of murder and mystery.

- - - - - Flu: The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus That Caused It / Gina Kolata (1999) I,III,V,VI
For all the stories about the bubonic plague (Black Death) of the Middle Ages or AIDS and Ebola today, the most deadly world pandemic occurred right at the end of WW I, the 1918 Influenza Epidemic. Now everybody has gotten the flu. But your grandparents or great-grandparents probably never told you or your parents about the 1918 flu. Fear of the 1918 flu returning helped drive the Swine Flu Vaccine fiasco of 1976. Dr. Phil was a college freshman then, but because college campuses are a hotbed of diseases, I went ahead and got my shot, even though the shot itself was by then considered dangerous.

- - - - - Betrayal of Trust: The Collapse of Global Public Health / Laurie Garrett (2000) II,IV,V,IX
I heard Laurie Garrett talking about her new book on NPR in the Fall of 2000 and rushed out to buy it. Garrett is the author of The Coming Plague, listed above, and as a reporter for Newsday, she has circled the globe covering stories like Ebola, AIDS, etc. What struck me was her comments, which I had never really thought about before, that public health is not only not the same as medicine, but that the two might be considered to be opposites – maybe even enemies in the battle for funding and money. She makes an excellent case for the sorts of problems that exist now and will blow up in our faces in the near future because of our failure to think in terms of global public health. Lots of times it is easy to both feel sorry for people dying of dread diseases in foreign lands like Africa and feel safe that such things will not affect us here at home in America. Be afraid... be very afraid...

- - - - - Genome: The Autobiography of a Species in 23 Chapters / Matt Ridley (1999) II,IV,V,IX
The Human Genome Project has been described as the biological equivalent of the Manhattan Project in physics. Now for a lot of reasons, Dr. Phil doesn't believe that, but mapping out the entire genome of the human species holds great promise for the treatment and prevention of disease – or it could hold the seeds of our destruction. Ridley, in part, tries to defuse the hyperbole by pointing out that the HGP is not revealing the entire human genome, but rather noting some of the averages of the common man (whatever anyone chooses that to mean). His example is one of blood type – which blood type will be the one included in the sample? However, there is no denying the scope of understanding where in all of our DNA strands that various traits are controlled. And in the Year 2000, two scientists at different institutions stunned the science world by declaring the human genome "decoded", complete, in a time far shorter than originally forecast for the work. These two men even made A&E Biography's Biography of the Year. So chapter by chapter, Ridley talks in broad views of what is known about our own genetics and the sorts of puzzles, surprises and sheer scope that is included.

New for the Fall 2002 collection!

- - - - - A Thread Across the Ocean: The Heroic Story of the Transatlantic Cable / John Steele Gordon (2002) II,IV,VI
A nice companion to The Victorian Internet earlier on the list, the laying of the telegraph cable connecting the New World with the Old World in the 19th century was the "Victorian equivalent of the Apollo project". Consider that before the cable was laid, the minimum communications time between the young United States and Europe was measured in days or weeks. No way would American dollars get invested in the European stock markets with that kind of time lag, nor would Europeans invest heavily in American projects. Again, it's a matter of perspective and paradigm shift – today it's wireless technology, and a general thinking that "this is totally new" / "we've never been here before". But realistically, that's not true. And technical historians can still illuminate our present with the past.

- - - - - Tuxedo Park: A Wall Street Tycoon and the Secret Palace of Science That Changed the Course of World War II / Jennet Conant (2002) II,IV,V
Alfred Lee Loomis is not a household name today, but James B. Conant is at least visible in the history of science in the 20th century. President of Harvard and advisor to U.S. Presidents on science matters, Conant was a friend of Loomis' and the author's grandfather. Today there is sometimes a strained relationship between academic & government science worlds and the corporate science world. And there is definitely a question in the post-Enron era of how much public good rich tycoons do our society. Loomis' story combines quite the American success story with

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a strong personal interest in science – and the will to put his money where his mouth was. This book makes a case that it was the support from Tuxedo Park that helped science win World War II, not just the big money government efforts like the Manhattan Project. Wonder if anyone has sent this book to Chairman Bill? (grin)

- - - - - Corpse: Nature, Forensics and the Struggle to Pinpoint Time of Death / Jessica Snyder Sachs (2001) II,IV,V,X

CSI, Law & Order, Sherlock Holmes, Crossing Jordan... Murder mysteries, police stories, even medical examiner and coroner accounts fascinate us, whether fiction or fact. It isn't just that we're all ghoulish monsters on the inside, honestly(!), but there is the intellectual puzzle of evidence, statement, clue and deduction. In this science of determining time of death, time represents both information and the enemy. At the moment of death, the complex chemical and biological systems in our bodies stop or slow, and various levels of degradation and invasion begin to set in. Science has progressed far beyond just measuring the state of rigor mortis or body temperature – and the Tennessee research facility described in Patricia Cornwall's The Body Farm is not fiction, but fact. Cool...

- - - - - A Beautiful Mind: The Life of Mathematical Genius and Nobel Laureate John Nash / Sylvia Nasar (1998) II,IV,IX

Nothing engenders interest in a fine book like a compelling movie. And a hit movie about a high-end mathematician? Never happens. There is no question that "A Beautiful Mind", starring Russell Crowe and Jennifer Connelly, deserved the attention it received, but anyone reading the book will wonder once again how Hollywood managed to do it – create a completely different story and emphasis. However you cut it, though, the point remains that here is a man labeled as a genius, who worried mightily about "making a contribution" to his beloved mathematics, who disappears into a hellish world of schizophrenia, only to reemerge by his own will able to accept a much deserved Nobel Prize in Economics (there is no Nobel in mathematics).

- - - - - The Universe in a Nutshell / Stephen Hawking (2001) II,VIII
As Hawking himself admits in the Foreword, he never expected A Brief History of Time (1988) to be the success it has been, especially considering the difficulty of the subject matter. Science educators worry that too many of the people who bought that book did so merely to put in prominently on their coffee tables or bookshelves as if pretending to have read it. And many of Dr. Phil's students who have tried Brief didn't necessarily do so great a job either reading the book or writing the paper. So I join with Hawking in having some trepidation in adding this book to the list – Hawking finally deciding he didn't want to do Son of A Brief History of Time, so much as updating and talking about the cool things that this paralyzed man has been thinking about the last dozen years. The illustrations are slick and computer generated. Full of color, they sometimes resemble really bad physics textbook illustrations – you need a key to understand what the heck they're about. However, there is plenty of physics and ideas that are quite understandable to face you the base, and the chance to understand the really "far out" consequences of what might happen if physics works a particular way.

- - - - - Cryptonomicon / Neal Stephenson (1999) I,III,IV,V,VIII,IX
Oh, yeah, here's a real Dr. Phil book – 910 pages and includes zeta functions, equations with infinite sums, Perl scripts and an appendix with a coding scheme. It's technofiction, coupled with World War II code decryption, deceit and a mad pursuit of missing gold. It's modern, talking about computer networks, infrastructure, bandwidth, data havens and security issues. And Finns, MLA (Modern Language Association), Alan Turing, Bletchley Park, U-boats. Having read this book in July 2001, I found myself fully prepared to understand the collapse of Global Crossings. Much fun, but you've got to be a reader. (Dr. Phil devoured it in three days, in between other work.)

End of List

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