Science and Science Fiction in the Classroom

David A. Katz
Chemist, educator and consultant
Tucson, AZ 85745
Email: dkatz45@msn.com
Web site: http://www.chymist.com
• Two DivCHED symposia on Chemistry and Science Fiction
  – 203rd ACS National Meeting in 1992
  – 214th ACS National meeting in 1997
• Book: *Chemistry and Science Fiction*, Jack H. Stocker, Editor, 1999.
Science fiction in my classroom

• Incorporated the use of science fiction in non-major chemistry classes:
  – Science and Society, 1993
  – Chemistry and Society, 2003
• Focus on short stories rather than novels, with references to motion pictures and television shows
• Aim is to present a wide view of science as incorporated into fiction
• Goal is increased science literacy, not an in-depth examination of the science in the individual readings
Science fiction in my classroom

• Short stories, bibliographies, and related articles distributed on a CD-ROM
• Classroom discussions
• Students are required to write a short science fiction story as part of their assessment for this portion of the course
Stories on my CD-ROM

• Sound of Thunder – Ray Bradbury
  – The classic time travel story

• Ado – Connie Willis
  – Censorship in a PC world

• All You Zombies – Robert A. Heinlein
  – Time travel

• Article of Faith – Mike Resnick
  – A robot asks questions about God

• As Chemist to Chemist – Isaac Asimov
  – A cryptic message from one chemist to another.

• At the Rialto – Connie Willis
  – Quantum mechanics according to a conference in Hollywood
• Blood Music – Greg Bear
  – Early nanotechnology

• Chip Runner – Robert Silverberg
  – A young boy wants to become a computer

• Desertion – Clifford D. Simak
  – Explorers on Jupiter keep deserting for their team

• Diamond Rain – Steve Buick
  – A world rotates so quickly that days and nights last four hours each.

• Divided by Infinity – Robert Charles Wilson
  – A man finds some unusual books which are fakes, but they are authentic.

• Earth Hour – Ken Macleod
  – A wealth man is stalked by an assassin.
• End of the World – Alma Alexander
  – A woman takes a trip to witness the end of the Earth
• Fire Watch – Connie Willis
  – Time travel to the London blitz
• Flowers for Algernon – Daniel Keyes
  – Surgery is used to increase a man’s intellect.
• Golden Apples of the Sun – Ray Bradbury
  – Collecting solar material as an energy source
• Half-Life – Paul Preuss
  – The fictional last days of Marie Curie
• Health Hazard – Howard L. Myers
  – An inhabitant of another planet is having a problem purchasing her favorite Earth food – chocolate.
• History Lesson – Arthur C. Clarke
  – Venusesians try to decipher materials from a long dead Earth.
• **How To Talk To Girls At Parties – Neil Gaiman**
  – Teenage boys go to a party to meet girls
• **Instinct – Lester Del Rey**
  – Robots labor to recreate the extinct human race.
• **Join – Liz Coleman**
  – Returning home to visit his family, a man must inform them he has married an alien.
• **Last Contact – Stephen Baxter**
  – A field of dark energy is devouring the universe
• **Light of Other Days – Bob Shaw**
  – Images are retained for a long time in slow glass.
• **Making Light – James P. Hogan**
  – A corporation bids for a contract to make a standard Mark IV universe.
• **Nightfall** – Isaac Asimov
  – Multiple suns provide constant light. Night comes every 2500 years

• **Omnilingual** – H. Beam Piper
  – Trying to decipher writings of a long dead Martian race

• **Pate de Foie Gras** – Isaac Asimov
  – The goose lays golden eggs

• **Relativistic Effects** – Gregory Benford
  – A 7000-passenger ship traveling from Earth is locked in full thrust

• **Samson in the Temple of Science** – Harry Harrison
  – Samson, a janitor at a research lab, learns about his origin.

• **Schrodinger’s Kitten** – George Alec Effinger
  – A Middle-Eastern woman travels through alternate realities.

• **Softlight Sins** – Peter F. Hamilton
  – A new procedure to punish a criminal deletes his memory and personality.
• Temporal Chirality - Brian Adddle, Michael J. S. Dewar, Hans Krapp, Till E. Spiegel and (in part) Michel Obb
  — A spoof technical paper
• The Beautiful People – Charles Beaumont
  — A teenage girl is approaching the age when she will undergo an operation to make her beautiful like everyone else.
• The Clockwork Atomic Bomb – Dominic Green
  — A weapons inspector find devices left over from a war, but the economy of the country is built on them.
• The Cold Equations – Tom Godwin
  — A young girl stows away on an emergency dispatch ship.
• The Curious Case of Benjamin Button – F. Scott Fitzgerald
  — A form of time travel as the main character is born old and ages backward.
• The Feeling of Power – Isaac Asimov
  – Humans, in a future computerized world, have forgotten how to do math. One man figures out how to do paper and pencil arithmetic.

• The Food of the Gods – Arthur C. Clarke
  – Animals are no longer slaughtered and all food is now synthesized. A company is producing a new food that has become very popular.

• The Hammer of God – Arthur C. Clarke
  – An asteroid is headed toward Earth

• The Last Question – Isaac Asimov
  – Can entropy be reversed?

• The Minority Report – Philip K. Dick
  – Predicting future crimes.

• The Monkey’s Paw – W. W. Jacobs
  – What happens when you make three wishes.

• The Nine Billion Names of God – Arthur C. Clarke
  – Buddhist monks have a task to write all the names of God.
• The Riddle of the Universe and Its Solution – Christopher Cherniak
  – A computer research project includes content that produces catatonia in anyone who views it.
• The Sentinel – Arthur C. Clarke
  – Prelude to 2001 Space Odyssey
• The Shangri-La Affair – Lavie Tidhar
  – A search for a virus that brings peace
• The Sidon in the Mirror – Connie Willis
  – Life on a burned out star mining hydrogen.
• The Star – Arthur C. Clarke
  – A group of space explorers discover a vault containing records of a civilization that was destroyed when their sun went nova.
• The Variable Man – Philip K. Dick
  – A man from the past helps a future Terran society in a war.
• The Very Slow Time Machine – Ian Watson
  – A time machine travels back in time by one hour every hour.
• There Will Come Soft Rains – Ray Bradbury
  – The story of an automated house.
• Thiotimoline (The Endochronic Properties of Resublimed Thiotimoline) – Isaac Asimov
  – A spoof technical paper – actually published.
• Too Bad – Isaac Asimov
  – A human-sized robot capable of infinite self-miniaturization, is called upon to save the life of his cancer-stricken human inventor.
• Understand – Ted Chaing
  – An experimental drug is used to boost intelligence.
• Waiting for Rain – Mary Robinette Kowal
  – A wine grower needs to pay for rain for his crops.
• We Can Remember It for You Wholesale – Philip K. Dick
  – Story that was the basis for the film Total Recall.
• Art and special Effects:

Art has been an important aspect of science fiction, not only the illustrations in science fiction stories and the cover art for science fiction magazines, but a major contribution to the movies and today’s special effects.
• Art and special Effects:
  – King Kong.
    • An article from *Invention & Technology* about the making of the original movie.
  – Star Wizards.
    • An article from *Invention & Technology* about special effects in *Star Wars* and *Close Encounters*
  – To Boldly Paint What No Man Has Painted Before.
    • An article from *Invention & Technology* about Chesley Bonestell who created paintings of other worlds that helped inspire the space program.
• Jurassic Park:
  Is Jurassic Park possible? These articles relate to the science behind the story.
  – Ancient DNA (Scientific American, Nov. 1993)
  – Captured in Amber (Scientific American, April 1996)
• Nanotechnology:
  – Quantum Mechanical Computers (Scientific American, 1997)
  – Shamans of Small (Scientific American, Sept. 2001)
  – Waiting for Breakthroughs (Scientific American, April 1996)
• Space Travel:
  – Isn’t It Ionic? (Invention and technology)
• Star Trek:
  – Beam Me Up (Chemistry World, October 2004)
  – Negative Energy, Worm Holes, Warp Drive (Scientific American, January 2000)
  – Quantum Teleportation (Scientific American, April 2000)
  – Star Trek’s Slow Start (Invention and Technology)
  – Where No One Has Gone Before – Chemistry in Star Trek (Natalie Foster, Chemistry and Science Fiction, 1998)
• Star Wars:
  – How Star Wars Surprised the World
    (Invention and Technology)

• Time Travel:
  – Build a Time Machine
    (Scientific American, September 2002)
  – Quantum Physics of Time Travel
    (Scientific American, March 1994)
Bibliographies

• Bibliography of Science Fiction (A Bibliography of Science Related Science Fiction) – Connie Willis
• Science Fiction About Physics – Connie Willis
• Science and Science Fiction (Science and Science Fiction, With emphasis on Chemistry and Science Fiction) – David A. Katz
• Science Fiction in the Classroom (Ways to Use Science Fiction in the Classroom) – Connie Willis, David Katz, and Courtney Willis
Science Fiction Web Sites

• **Technovelgy** *(tech-novel-gee!)*
  – The Technovelgy web site which lists inventions, technology and ideas of science fiction writers.
    • Timeline of Science Fiction Ideas, Technology and Inventions
    • Glossary of Science Fiction Ideas, Technology and Inventions
    • Science Fiction in the News: Predictions of science fiction writers that are coming true in today’s world
• Center for the Study of Science Fiction
  – This is the J. Wayne and Elsie Gunn Center for the Study of Science Fiction at the University of Kansas.
  • News of lectures, conferences, awards, workshops, and competitions
  • Essays on science fiction
  • Links to science fiction websites and other resources including teaching and scholarly resources
  • A listing of a basic science fiction library with links to sources
- **Sci-Fi Science**
  - A web site created by a group of professional scientists to explore the true science underlying popular science fiction.

<table>
<thead>
<tr>
<th>Sci-Fi Topics</th>
<th>Doctor Who</th>
<th>Other Sci-Fi</th>
<th>Fantasy (Non-Sci-Fi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Travel</td>
<td>Episodes The Doctors</td>
<td>Star Trek Star Wars</td>
<td>Harry Potter</td>
</tr>
<tr>
<td>Crystal Power</td>
<td>Companions Enemies</td>
<td>Fringe Firefly</td>
<td>Lord of the Rings</td>
</tr>
<tr>
<td>Teleportation</td>
<td></td>
<td>Alien Terminator</td>
<td>Spiderman</td>
</tr>
<tr>
<td>Aliens</td>
<td></td>
<td>Planet of the Apes</td>
<td>Tomb Raider</td>
</tr>
<tr>
<td>Hyperdrive</td>
<td></td>
<td>V</td>
<td>Indiana Jones</td>
</tr>
<tr>
<td>Shields</td>
<td></td>
<td>Many others</td>
<td>Iron Man</td>
</tr>
<tr>
<td>Weapons</td>
<td></td>
<td></td>
<td>X-Men</td>
</tr>
<tr>
<td>Immortality and Death</td>
<td>Torchwood More</td>
<td></td>
<td>Frankenstein</td>
</tr>
<tr>
<td>Doomsday</td>
<td></td>
<td></td>
<td>King Kong</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Many others</td>
</tr>
</tbody>
</table>
• AboutSF
  – The Educational outreach arm of the Center for the Study of Science Fiction and is a joint-project of the science Fiction and Fantasy Writers of America and the Science Fiction Research Association.
  • Science Fiction Podcasts! A number of readings of stories
  • Talks and Conventions (mainly in Kansas)
  • Resources for studying science Fiction
  • Reader's guides and teacher resources.
• The Best Science Fiction Stories Ever Written
  – A web site by Rusty with an extensive listing of science fiction short stories, a description of each story, and where to find them.

• Infinity plus
  – A web site for science fiction, fantasy, and horror stories, extracts, reviews, interviews and more.
Science Fiction Reading List for CHM 121IN for Spring 2013

- A Sound of Thunder
- Ado
- Blood Music
- Flowers for Algernon
- History Lesson
- Instinct
- Join
- Light of Other Days
- Making Light
- Nightfall
- Omnilingual
- Softlight Sins
- The Cold Equations
- The Curious Case of Benjamin Button
- The Hammer of God
- The Last Question
- The Minority Report
- The Nine Billion Names of God
- The Sentinel
- The Sidon in the Mirror
Classroom Discussion/Activity

Focus is on:
- An overview of the story plot
- Where the story takes place
- When the story takes place
- The science in the story
- The plausibility of the science/story
- The impact of the story

Assessment:
- Write a science fiction story
Laboratory Experiments during science fiction discussions

• Mainly nanotechnology experiments
  – Synthesis of Aqueous Ferrofluid Nanoparticles (a magnetic fluid)
  – Synthesis of Cholesteryl Ester Liquid Crystals
  – Titanium Dioxide Raspberry Solar Cell
  – Nitinol Wire
Contact Information:

David A. Katz

Email: dkatz45@msn.com
Web site: http://www.chymist.com
Select Science Fiction from the left-hand menu

View a PDF of this paper at:
Recent Papers and Presentations