12. THE CHEMISTRY OF ART: TEACHING SCIENCE IN A LIBERAL ARTS CONTEXT. **Richard Hark**[1]; [1]Juniata College, Von Liebig Center for Science, Department of Chemistry, Huntingdon, PA

College-level courses which combine chemistry and art allow students, who may normally be adverse to science, to explore the world of art through the eyes of a chemist. The Chemistry of Art is an innovative, laboratory-based, non-majors course that covers many of the basic concepts of general chemistry, as well as aspects of analytical and organic chemistry. The course allows students to develop an appreciation of the overlap between chemistry and art as they learn about the chemical composition and properties of artists' materials such as paints, dyes, alloys, ceramics, glass, paper, and photographic materials. Hands-on experience with the synthesis and analysis of pigments, the casting and patination of bronze and the preparation of a fresco enrich the students' understanding of the experimental nature of chemistry. It is especially useful to museum studies, art history and studio art majors and serves as a popular science elective for students in other non-science disciplines. A background in chemistry or art is not required to gain an appreciation of how these two disciplines naturally complement one another. The application of chemistry to the restoration and study of priceless artworks, including Michaelangelo's exquisite frescos in the Sistine Chapel, Bellini's painting The Feast of the Gods, and Cellini's Perseus statue will be examined. The role of chemistry in ascertaining the authenticity of artworks and artifacts, including the Van Meegeren's famous Vermeer forgeries and the Shroud of Turin will be briefly presented. Useful resources and ideas for implementation of similar courses will also be shared.

13. PROCESS ORIENTED GUIDED LEARNING: A STUDENT-CENTERED APPROACH TO CHEMISTRY EDUCATION. **Richard Moog**[1]; [1]Franklin and Marshall College, P.O. Box 3003, Lancaster, PA

Process Oriented Guided Inquiry Learning (POGIL) is a newly-funded NSF project whose focus is the national dissemination of an innovative instructional approach based on the current understanding of how students learn best. The POGIL approach involves creating a learning environment where students are actively engaged in mastering a discipline and in developing essential skills by working in self-managed teams on guided inquiry activities. This presentation will introduce the POGIL principles, provide data on the effectiveness of the approach, and describe how the project can assist others interested in implementing these types of active-learning approaches.

14. A NEW ELEMENT ON THE PERIODIC TABLE - IT - USING THE ELEMENT OF INFORMATIN TECHNOLOGY IN THE CHEMISTRY CLASSROOM. **John Penn**[1]; [1]West Virginia University, P.O. Box 6045, Morgantown, WV

15. VIRTUAL LABS AND SCENARIO BASED LEARNING FOR INTRODUCTORY CHEMISTRY. **David Yaron**[1], Michael Karabinos[1], D. Milton[1], Karen Evans[2], Gaea Leinhardt[2]; [1]Carnegie Mellon University, Department of Chemistry, Pittsburgh, PA; [2]University of Pittsburgh, Pittsburgh, PA

We are developing technologies that address two main learning challenges in introductory chemistry. Our virtual laboratory addresses the first challenge, that of helping students connect the algebraic manipulations of the current course with authentic chemistry. This is done through our virtual lab, a flexible Java applet that allows students to choose from hundreds of standard reagents and manipulate them in a manner that resembles that of a real lab. The lab allows us to couple the paper-and-pencil activities of the current course with activities that involve chemical manipulations and experimental design. The other major learning challenge in introductory chemistry is coupling chemical knowledge with the real world. Our CreateStudio authoring tools allow non-programmers to create scenarios that embed chemical manipulations in contexts that highlight their utility. By comparing textbooks with the NY Times´ Science Times and Scientific American, we have identified and characterized a misalignment between chemistry instruction and the demands of chemical literacy. We will use our Mixed Reception murder mystery activity to illustrate how imbedding current course concepts in scenarios can address this misalignment, while requiring only minor changes to current course structures.

16. SYNTHESIS AND CHARACTERIZATION: GUIDED INQUIRY AND MOLECULAR MODELING IN AN UPPER LEVEL COMPREHENSIVE LAB. **Elisabeth Bell-Loncella**[1]; [1]University of Pittsburgh, Engineering & Science Building, Johnstown, PA

Historically, the upper level laboratory chemistry courses at Pitt-Johnstown have focussed on analytical and physical chemistry. Desiring to broaden the scope and incorporate advanced organic and inorganic synthetic methods in the

curriculum, we introduced a two credit elective, Physical Inorganic Lab (see chem 1132 at http://dradvisor.upj.pitt.edu/cgi-bin/CourseCatalogSubjects.cfm) in the spring of 1995. Students taking the lab course prepare a broad range of inorganic compounds using various synthetic methods and characterize their products using all relevant spectroscopic, electrochemical and physical techniques available in the Department. The class is small; thus, for each experiment, or project, each student prepares a different example of a class of compounds (e.g. cobalt coordination complexes, organometallic compounds with arene ligands, complexes exhibiting isomerization, etc.). At the end of each project, students report their results in a group meeting format after which they submit a formal report. Recently we changed the course name and number (Chem 1133) and broadened the scope to include synthesis and characterization of organic as well as inorganic compounds. The projects are presented in a discovery format and the students, working in teams, develop their experimental procedure using available resources. Instead of using a published lab manual, students obtain necessary information from the internet and the chemical literature The next iteration will include a molecular modeling component. An overview of the course design, some sample projects, and the molecular modeling component - a work in progress - will be presented.