MUSEUM PREVENTIVE CONSERVATION I – PREVENTIVE CONSERVATION CONCEPTS
Course Outline and Syllabus, Fall 2016

General Course Information
Museum Preventive Conservation I
3.0 credits
CRN 12236 AH 6286.80
CRN 11356 ANTH 6203.80
CRN 11817 MSTD 6203.80

Dates and Times
Thursdays 6:10pm–8:00pm
Classes begin 01 September 2016
Holiday 24 November 2016
Last class 08 December 2016

Venue
National Museum of Natural History, Smithsonian Institution, 10th and Constitution, Washington, DC.
Students should assemble by 6:00pm in the Constitution Avenue lobby of the National Museum of Natural History. An escort will take you to the classroom as a single group. Please bring a photo ID in case the security guards request one. If you are unable to be present by 6:00 PM, please make arrangements with the instructors for someone to meet you in the lobby.

Course Directors and Primary Instructors
Catharine Hawks
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Required Reading Materials
Available from GW Bookstore; alternate sources given below
Hatchfield, P. 2002. *Pollutants in the Museum Environment: Practical Strategies for Problem Solving in Design, Exhibition, and Storage*. Archetype Press, London. ISBN 1-873132-96-4 http://www.archetype.co.uk/publication-details.php?id=64

Landry, G. (ed.). 2000. *The Winterthur Guide to Caring for Your Collections.* Henry Francis DuPont Winterthur Museum, Inc., Winterthur, DE. ISBN 0-912724-52-8 http://www.winterthurstore.com/product/410696/The-Winterthur-Guide-to-Caring-for-Your-Collection.html?cid=111

Szcepanowska, H. 2013. *Conservation of Cultural Heritage: Key Principles and Approaches.* Routledge, New York. ISBN 978-0-415-67475-1 paperback http://www.routledge.com/books/details/9780415674751/

Purchase directly from publisher/distributor; may not be available via GW Bookstore
ASHRAE Chapter A-23 2015. Applications Handbook, Chapter 23 Version 2015. *Museums, Galleries, Archives, and Libraries*. Purchase PDF (buy version in Inch-Pounds). http://www.techstreet.com/products/1897225

Hawks, C., M. McCann, K. Makos, L. Goldberg, D. Hinkamp, D. Ertel, and P. Silence (eds). 2011. *Health & Safety for Museum Professionals*. AIC Health & Safety Committee and Society for the Preservation of Natural History Collections, New York, NY.
Order from: http://www.universityproducts.com/cart.php?m=product_list&c=2097

Image Permanence Institute. 2012. *IPI's Guide to Sustainable Preservation Environments.* Image Permanence Institute, Rochester, NY.
https://www.imagepermanenceinstitute.org/store/publications/sustainable-preservation-practices-guidebook

Warda, J. (ed.). 2011 *The AIC Guide to Digital Photography and Conservation Documentation.* 2nd ed. American Institute for Conservation, Washington, DC.
http://store.conservation-us.org/site/index.php?app=ecom&ns=prodshow&ref=AIC-1

Available at no charge (see Blackboard site or link below for access)

Ashley-Smith, J., A. Burmester, and M.Eibl (eds.). 2013. *Climate for Collections: Standards and Uncertainties.* Postprints of the Munich Climate Conference, 7 to 9 November 2012. Doerner Institut, Munich.
http://www.doernerinstitut.de/downloads/Climate_for_Collections.pdf

Grzywacz, C. 2006. *Monitoring for Gaseous Pollutants in Museum Environments.* Getty Conservation Institute, Los Angeles.
http://www.getty.edu/conservation/publications_resources/pdf_publications/monitoring_gaseous.html

Preventive Team, Conservation Department, Winterthur Museum. 2013 ed. *Guidelines and Procedures for Preventive Conservation Winterthur Museum.* Winterthur Museum and Country Estate, Newark, DE (available on Blackboard)

Stauderman, S. and W. Tompkins., eds. 2016. *Summit on the Museum Preservation Environment.* Smithsonian Scholarly Press, Washington, DC. http://www.scholarlypress.si.edu/store/new-releases/proceedings-smithsonian-institution-summit-museum-/

Strang, T. J. 2013 *Studies in Pest Control for Cultural Property.* University of Gothenburg, Gothenburg.
https://gupea.ub.gu.se/handle/2077/31500 (download 3 pdfs for complete text).

Waller, R. W. 2006. *Cultural Property Risk Analysis Model.* University of Gothenburg, Gothenburg.
http://protectheritage.com/blog/ (sign in to receive access to free pdf of complete text)

Suggested but not required

Bigras, C., M. Choquette, and J. Powell. 2010. *Lighting Methods for Photographing Museum Objects.* Canadian Conservation Institute, Ottawa.
http://canada.pch.gc.ca/eng/1454704828075 (then search under publications)

Additional readings (required and supplemental) are available on the course Blackboard Site

Supplies (required)

Each student should ***bring a small hand lens or optivisor (anything from 2-10x)*** to all class sessions dealing with materials in collections, and for the laboratory sessions. Each student should also ***bring a pair of indirectly vented safety goggles*** (see below for style; available at hardware stores) for each of the 2 laboratory sessions.


or

and


Additional Resources (available at no charge)

American Institute for Conservation – *Journal of the American Institute for Conservation* (electronic archive of articles) www.conservation-us.org click on Publications & Resources, then on Online Resources

CAMEO materials database – information on hundreds of materials found in museum collections
http://cameo.mfa.org/wiki/Category:Materials_database

Canadian Conservation Institute – preservation and preventive conservation resources
http://canada.pch.gc.ca/eng/1454704828075

Getty Conservation Institute – free publications on conservation and preservation, in pdf format
http://www.getty.edu/conservation/publications/pdf_publications/
Institute of Conservation (ICON) – series on how to care for various objects
http://www.icon.org.uk/index.php?option=com_content&task=view&id=9&Itemid=10
Image Permanence Institute – free download of the Preservation Calculator, other free publications on preservation of photographic material, information on the Photographic Activity Test and AD Strips
www.imagepermanenceinstitute.org
Journal of Conservation and Museum Studies
http://www.jcms-journal.com/issue/archive/
Museum Pests Network – information on pest ID and control www.museumpests.net
National Archives and Records Administration, electronic publications on preservation
www.archives.gov/preservation/
National Fish & Wildlife Service Forensic Laboratory – *Identification Guide for Ivory and Ivory Substitutes*.
http://www.lab.fws.gov/ivory.php
National Park Service – *Preservation Briefs* and other publications on preservation of historic structures
http://www.nps.gov/tps/how-to-preserve/briefs.htm
National Park Service – *Conserve-O-Grams* and *NPS Handbook* (3 vols)
http://www.cr.nps.gov/museum/publications/conserveogram/cons_toc.html
Preserv'Art – review of products for use with collections and glossary of terms,
http://preservart.ccq.gouv.qc.ca/index.aspx
Researching Ivory – links to a host of resources regarding ivory, http://www.ebur.eu/index.php?q=1&s=0&t=1
Smithsonian Institution – links to brochures on various topics for care and handling of artifacts,
http://www.si.edu/mci/english/learn_more/taking_care/interesting_links.html
Society for the Preservation of Natural History Collections – electronic archive of journal issues, many related to preventive conservation topics, click on 'Publications' and follow links www.spnhc.com
University of Illinois Library. *Preservation Self-Assessment Program*. http://psap.library.illinois.edu/
Provides access to Format Guide, Glossary, and Bibliography; access to assessment tool requires sign-in, also at no charge. Particularly useful for identification of various photographic and sound recording media.
Wilhelm Imaging Research – information on the stability and longevity of printing ink, printer and printing and paper combinations. http://www.wilhelm-research.com/index.html

Course Description

Examines the history of preventive conservation in museums, the ethics that govern the conservation profession, and team approaches to collections care. *Introduces* interactions of materials and agents of deterioration that threaten collections, condition documentation, qualitative assessments, and when to consult a conservator and how to choose a conservator. *Presents* the literature and other resources available on preventive conservation.

Course Learning Objectives

- Review the evolution of a preventive conservation approach for museums and historic preservation
- Explain ethics and guidelines for practice in the conservation profession
- Compare differing approaches to conservation in various specialty fields and cultures
- Recognize issues related to cultural sensitivity of collection objects
- Recognize the scientific and conservation terms used in preventive conservation and know their meaning
- Safely handle cultural property
- Document the condition of museum objects in written and photographic form
- Describe agents of deterioration (fire, water, physical forces, pests, contaminants, light and ultraviolet radiation, incorrect temperature, incorrect relative humidity, displacers and vandals, and neglect) that act on cultural property and the types and levels of risk that may be posed by each one
- Describe mechanisms by which environmental agents of deterioration damage cultural property

- Identify materials that comprise cultural property, describe technologies used to create cultural property from these materials, and assess the effects of various agents of deterioration on these materials
- Evaluate physical and chemical properties of materials commonly used to store and display collections
- Compile and analyze information about materials that might be used to store and display collections, implement uncomplicated tests to screen these materials, and determine when in this process to consult a conservator
- Understand a qualitative assessment approach to collection care
- Recognize when to call a conservator and how to select an appropriate conservator.

Code of Academic Integrity

All students who take the course are must be familiar with and abide by the provisions of the George Washington University Code of Academic Integrity in completing assignments and examinations. A copy of the Code, provided as a PDF, is available at https://studentconduct.gwu.edu/academic-integrity

Accommodation for Religiously Observant Students

In keeping with University policy, students are to notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. These students will be permitted to be absent without penalty on such occasions, including permission to make-up examinations. The full policy is available at: https://registrar.gwu.edu/university-policies#holidays

Accommodation for Disabilities

In accordance with the Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act, and other applicable federal, state, and local laws, and as articulated in the University's Equal Opportunity Statement, the University does not discriminate against any qualified individuals with a disability. If you need disability accommodations, please register with Disability Support Services (DSS) at https://disabilitysupport.gwu.edu/registration. If you have questions about disability accommodations, contact DSS at (202) 994-8250 or email dss@gwu.edu, or visit them in person at Rome Hall, Suite 102.

All University Policies

For a full listing of GWU policies see: https://registrar.gwu.edu/university-policies

Grading

Method of Evaluation

Class participation	15%
Object condition report	15%
Quizzes (2 @ 10%)	20%
Lab reports	15%
Paper (team grade)	20%
Presentation (team grade)	15%

Letter Grade Equivalents

Numerical scores for assignments are posted on the Blackboard site for the course. Final grades are based on the BB weighted calculations and given as letter grades according to the following GWU letter grade system:

94-100 A
90-93 A-
87-89 B+
84-86 B
80-83 B-
77-79 C+
74-76 C
70-73 C-

Assignments ***Refer to Grading Rubrics to make sure you have included all required information***
Refer to Course Schedule for dates and times when assignments & quizzes are due

1. ***Paper - Risk Assessment of an Exhibit (group project)***

Working in teams, students will prepare an assessment of the agents of deterioration that might act on a particular long-term (more than 6 months) exhibit at a local museum. The exhibit must remain on view through the end of the semester and must incorporate a minimum of 4 different types of materials based on the categories discussed in class (plant, keratin/fibroin/chitin, collagen, inorganic non-metal, metal, natural composite, synthetic). The paper will:

- discuss the materials likely to be present in the objects on display and their vulnerability to agents of deterioration;
- provide data about agents of deterioration from repeated visits at different days of the week and times of day, including monitoring of temperature, relative humidity, and light levels
- prioritize the possible risks to the exhibit as a whole
- make recommendations concerning the steps that might be taken to verify and possibly mitigate the risks discussed in terms of short-, mid-, and long-term solutions
- provide estimates of probable costs involved in each mitigation step
- include references and full citations for all sources
- detail participation and contribution of each team member.

Students are encouraged to discuss their exhibit choices with the instructors as soon as possible after the course begins so that the instructors can notify the museums involved about the projects and obtain any necessary permission. Site selection and outlines are due to instructors within the first three weeks. Students will not contact museum staff independently, nor will they request access to the exhibits beyond that which is normal for members of the public visiting the facility

2. ***Presentation of Risk Assessment (PPT group project)***

Each team will be asked to make a brief (approximately 10 minutes) PowerPoint presentation on their findings at the final session of the course. Each member of the team must be part of the presentation. Practice as a group is essential for quick and smooth transitions – these are part of the total time allotment. Presentations will be structured as reports to a member of the museum's board and the museum's director (the instructors). The students in other teams will be asked to evaluate the structure and quality of the presentation effort (not the presentation content).

Keep in mind that photography may not be permitted in some museums/exhibits, which could have an impact on the quality of the presentations.

3. ***Condition Report (individual assignment)***

Each student is required to:

- select an object containing 3 or more different materials based on the materials groupings used in the course; object must be approved by instructors; object may be in a museum collection, but one owned by the student is preferred for access, handling, and photography
- prepare a narrative description of the object
- in addition to the narrative description, prepare a checklist of materials in the object, with information on where/how these are used in the object
- prepare a checklist of conditions and note to which materials in the object each conditions is relevant
- in addition to the condition checklist, prepare a narrative condition assessment of the object
- include all required data discussed in class, including but not limited to appropriate handling, transport, and environmental recommendations.
- add up to 6 images with appropriate documentation to the report; include scale in photos and descriptive captions for images
- include references and full citations for all sources of information on object and the materials in the object
- include photography log covering details about camera, settings, lighting, and images

4. ***Lab Testing Reports (group project with individual or sub-team report preparation)***

Working in teams, students will test materials during two lab sessions. Using a format provided by the instructors, students will prepare reports either individually or as part of a team, as assigned, on selected tests conducted during the lab sessions.

Course Syllabus

Sessions 1.1-2

Topics

Course overview

Preventive conservation - history, philosophy; conservation ethics and standards of practice

Terminology used in chemistry, physics, and conservation practice

Overview of materials in collections

Required Texts

Philosophy/history/ethics

Landry – Chapter 2

Preventive Team, Conservation Department, Winterthur Museum. 2013 *Guidelines and Procedures for Preventive Conservation Winterthur Museum.* Winterthur Museum and Country Estate, Newark, DE

Szczepanowska – Chapters 1 & 2

Scanned Required Readings

Philosophy/history/ethics

Fifield, R. 2016. The context of collection care: elements for creating an institutional preservation culture. Pp xix-xxiv, in *Collection Care* (B. Powell, ed.). Rowman and Littlefield, Lanham, MD.

Koller, M. 1994. Learning from the history of preventive conservation. Pp. 1-6 in *Preventive Conservation Practice, Theory and Research* (A. Roy and P. Smith, eds). International Institute for Conservation, London.

Lambert, S. 2010. Italy and the history of preventive conservation. CeROArt. http://ceroart.revues.org/1707

Merritt, J. and J. Reilly. 2010. Principles of preventive conservation: an overview. Pp. 11-16 in *Preventive Conservation for Historic House Museums* (J. Merritt and J. Reilly, eds.). AltaMira Press, Lanham, MD.

New Orleans Charter for Joint Preservation of Historic Structures and Artifacts. 1992. Association for Preservation Technology International /American Institute for Conservation, Washington, DC.

Ruskin, J. 2013 reprint of 1849 original. The lamp of memory. Pp. 2-5 in *Historical Perspectives on Conservation* (S. Staniforth, ed.). Readings in Conservation. Getty Conservation Institute, Los Angeles.

Staniforth, S. 2006. Agents of deterioration. Pp. 45-53 in *The National Trust Manual of Housekeeping: The Care of Collections in Historic Houses Open to the Public.* Butterworth-Heinemann, Oxford, UK. (Note that Staniforth references 9 agents, whereas in N. America, we incorporate a 10th – dissociation; see Session 3 Readings).

Staniforth, S. 2006. Conservation: principles, practice and ethics. Pp. 35-43 in *The National Trust Manual of Housekeeping: The Care of Collections in Historic Houses Open to the Public.* Butterworth-Heinemann, Oxford, UK.

Terminology/Materials

Weaver, G., J. Ashley-Smith, A. Roy, and S. Staniforth. 1987. Pp. 30-38, 63-87 in *An Introduction to Materials.* Science for Conservators, Vol. 1. The Conservation Unit, Museums & Galleries Commission, London.

Required Web Sites

Philosophy/history/ethics

The AIC Code governs the activities of all US conservators who are Professional Associates and Fellows, no matter where they work. American Institute for Conservation, *Code of Ethics and Guidelines for Practice* *http://www.conservation-us.org/about-us/core-documents/code-of-ethics#.U8Kti_1OXIU*

Terminology/Materials

CAMEO materials database – become familiar with this resource of information on hundreds of materials found in museum collections http://cameo.mfa.org/wiki/Category:Materials_database

Scanned Supplemental readings

Philosophy/history/ethics

Ashley-Smith, J. 1994. The ethics of conservation. Pp. 11-20 in *Care of Collections* (S. Knell, ed.). Routledge, London.

Malaro, M. 1998. Pp. 1-28 in*, A Legal Primer on Managing Museum Collections*. 2nd ed. Smithsonian Institution Press, Washington, DC.

Philippot, P. 1996. Restoration from the perspective of the humanities. Pp. 216-229 in *Historical and Philosophical Issues in the Conservation of the Cultural Heritage* (N. Price, M. Talley, and A Vaccaro, eds.). The Getty Conservation Institute, Los Angeles.

Stoner, J. 1992. The mortality of things. Pp. 10-17 in *Caring for Your Collections* (A. Schultz, ed.). National Institute for Conservation and Harry N. Abrams, NY.

van der Burg, J. 2010. Preventive conservation, a deliberate choice*. e-Conservation Magazine* (14): 22-26.

Ward, P. 1989. pp. 9-11 in *The Nature of Conservation: A Race Against Time.* Getty Conservation Institute, Marina del Rey.

Terminology/materials

Feller, R. 2008. Thoughts about crosslinking. *Western Association for Art Conservation (WAAC) Newsletter* 30(3):16-20.

Phillimore, E. 1976. *A Glossary of Terms Useful in Conservation.* Canadian Museums Association, Ottawa.

Torraca, G. 2009. *Lectures on Materials Science for Architectural Conservation.* Getty Conservation Institute, Los Angeles, CA.

Supplemental Web Sites

Philosophy/history/ethics

The CAPC Code governs the activities of Canadian conservators who have obtained professional certification through CAPC, and is broadly applicable to all Canadian conservators, no matter where they work. Canadian Association of Professional Conservators, *Code of Ethics*. http://capc-acrp.ca/ethics.asp

Terminology/materials

AIC Caring for Your Treasures brochure series
http://www.conservation-us.org/about-conservation/caring-for-your-treasures#.V4vov7grLIU

Sessions 2.1-2

Topics

Object handling guidelines and demonstrations

Condition assessments and condition reports. Object evaluation discussions.

Imaging for condition documentation

Discussion of papers and presentations

Required Texts

Handling

Hawks et al. – Chapters 5, 8-12 and 15

Szczepanowska – Chapter 3

Condition imaging

Warda et al. – Chapters 1-5

For *Supplemental Reading* on imaging techniques, read Chapter 6

Scanned Required Readings

Handling

Cheel, V., P. Northover, C. Salter, D. Stevens, G. Grime, B. Jones. 2010. The effects of fingerprints on silver. Pp. 173-177 in *Metal 2010.* Proceedings of the Interim Meeting of the ICOM-CC Metal Working Group, Charleston, South Carolina, USA,11-15 October 2010. ICOM-CC, Charleston.

Powell, B. 2016. Pp. 81-101 and 117-141, in *Collection Care,* Rowman and Littlefield, Lanham, MD.

Condition Imaging

Bigras, C., M. Choquette, and J. Powell. 2010. Pp.22-25, 40-42, 44-45, in *Lighting Methods for Photographing Museum Objects.* Canadian Conservation Institute, Ottawa

Cattrell, P. 2005. Pp. 16-18 in *Foundation Course: Photography.* Cassell Illustrated, London.

Required Web Sites (review to understand range of content)

Condition assessments and handling

CAMEO materials database – become familiar with this resource of information on hundreds of materials found in museum collections http://cameo.mfa.org/wiki/Category:Materials_database

Scanned Supplemental Readings

Condition assessments

Canadian Conservation Institute. 2010. *The Identification of Natural Fibres*. CCI Notes 13/18. Canadian Conservation Institute. Ottawa. 6 pp.

Pozeilov, Y. 2013. iPad condition reporting 2.0. *WAAC Newsletter* 35(1):19-22.

Handling

Chayes, E., M Gleeson, and V. Muros. n.d. *Inks and Barcodes: Methods of Labeling and Tracking Objects*. PowerPoint presentation.

Strahan, D. 2001. Uranium in glass, glazes and enamels: history, identification and handling. *Studies in Conservation* 46(3):181-195.

Sessions 3.1-2

Topics

Risk assessments and risk calculation

Exhibition maintenance

Exhibition walkthrough at NMNH

Required Texts

Assessments

Waller, R. W. 2006. Chapters 2-5 in *Cultural Property Risk Analysis Model.* University of Gothenburg, Gothenburg. http://protectheritage.com/blog/ (sign in to receive access to free pdf of complete text)

Scanned Required Readings

Assessments

Brokerhof, A. 2006. *Collection Risk Management – The Next Frontier*. Paper presented at the CMA Cultural Property Protection Conference, Ottawa, 16 January 2006. 5 pp.

Waller, R. 1995. Risk management applied to preventive conservation. Pp. 21-27 in *Storage of Natural History Collections: A Preventive Conservation Approach* C. Rose, C. Hawks, and H. Genoways, eds.). Society for the Preservation of Natural History Collections, Iowa City.

Exhibition maintenance

Cooney, E. n.d. *Exhibition Maintenance Questionnaire* and *Task Sheet – Sample & Appendix*

Hirsch, J. and C. Gallagher. 2013. Defensible collections: designing a safe exhibit space. Collection Forum 27(1-2): 72-88.

Nemmers, L. n.d. *On Guard! Protecting Collections from Deterioration*. Samuel P. Harn Museum of Art, University of Florida, Gainesville

Scanned Supplemental Readings

Assessments

Heritage Preservation. 2002. *Best Practices for General Conservation Assessments.* Heritage Preservation, Washington, DC.

Heritage Preservation. 2004. *Best Practices for Conditions Assessments of Historic Structures.* Heritage Preservation, Washington, DC.

Exhibition maintenance

Allen, S. 2011. *IPM Pest Tool*. National Museum of Natural History, Smithsonian Institution.

Nightingale, C. 2011. Designing and exhibition to minimize risks to costume on open display. Chapter 37 in, *Preventive Conservation in Museums* (C. Caple, ed.). Routledge, London and New York.

Raphael, T. 2005. Preventive conservation and the exhibition process: development of exhibit guidelines and standards for conservation. *Journal of the American Institute for Conservation* 44:245-257.

Sessions 4.1-2

Topics

Agents of deterioration and mechanisms by which these damage to collections

Environmental agents and parameters and risk calculation exercise

Required Texts

Agents of deterioration, including environmental agents

Ashley-Smith et al. – pp. 21-33 (article by Henderson and Dai)

ASHRAE 2015 – pp. 1-12 (environmental effects)

Grzywacz – Chapters 3-5, and review Appendix 1 and Appendix 2

Hatchfield – pp. 5-42, 55-133, and review Appendix 2 and Appendix 3

Image Permanence Institute – Introduction and Chapters 1-3

Landry – Chapter 1

Strang – Chapter 1

Required Web site (review to understand range of content)

Agents of deterioration, including environmental agents

CCI Agents of Deterioration http://canada.pch.gc.ca/eng/1447441965839

Scanned Required Readings

Agents of deterioration, including environmental agents

Klein, D. 2008. *Identifying Museum Insect Pest Damage.* NPS Conserv O Gram 3/11. 7 pp.

Wei, W., L. Sauvage, and J. Wölk. 2014. Baseline limits for allowable vibrations for objects. in *ICOM-CC 17th Triennial Conference Preprints, Melbourne, 15-19 September 2014,* ed. J. Bridgland, art. 1516, 7 pp. International Council of Museums, Paris.

Pretzel, B. 2003. Materials and their interaction with museum objects*. V&A Conservation Journal* Summer (44): 1-4 & chart of pollutants vs materials.

Scanned Supplemental Readings

Agents of deterioration, including environmental agents

Ashley-Smith et al. (from the required text) – any remaining chapters.

Ashley-Smith, J. 1999. Physical effect, pp.193-225 in *Risk Assessment for Object Conservation.* Butterworth Heinemann, Oxford, UK.

Bullock, L. and D. Saunders. 1999. Measurement of cumulative exposure using blue wool standards. Pp. 21-26 in *Preprints of the ICOM-CC 12th Triennial Meeting, Lyon, 29 August-3 September 1999.* James and James, London.

Butler, R, M. Rolfe, J. Walsh, D. Abraham, and International Conservation Services. 2014. *A Practical Guide to Sustainable Climate Control and Lighting in Museums and Galleries.* International Conservation Services and Steensen Varming, Sydney.

Hatchfield, P. 2011. Crack, warp, shrink, flake: a new look at conservation standards. *Museum* (Jan-Feb):40-43, 51-53.

Lambert, S. and J. Henderson. 2011. The carbon footprint of museum loans: a pilot study at Amgueddfa Cymru–National Museum Wales. *Journal of Museum Management and Curatorship* 26(3):1-27.

Lithgow, K., H. Lloyd, P. Brimblecomb, Y. Yoon, and D. Thickett. 2005. Managing dust in historic houses - a visitor/conservator interface. Pp. 662-669 in *Preprints of the COM-CC 14th Triennial Meeting, The Hague, 12-16 September 2005*. International Council of Museums and James & James Publishers, London.

Lloyd, H. and T. Mullany. 1994. The impact of overvisiting: methods of assessing the sustainable capacity of historic houses. Pp. 132-138 in *Preventive Conservation Practice, Theory and Research* (A. Roy and P. Smith, eds). International Institute for Conservation, London.

Merritt, J. and J. Reilly. 2010. Preventive conservation and light. Pp. 61-78 in *Preventive Conservation for Historic House Museums* (J. Merritt & J. Reilly, eds). Altimira Press, Lanham, MD.

Nazaroff, W., M. Ligocki, L. Salmon, G. Cass, T. Fall, M. Jones, H. Harvey, and T. Mau. *Airborne Particles in Museums.* 1993. Getty Conservation Institute, Marina del Rey.

Padfield, T. 2007. Why keep climate records – and how to keep them. Pp.157-163 in *Museum Microclimates: Contributions to the Conference in Copenhagen, November 2007* (T. Padfield and K. Borchersen, eds.). National Museum of Denmark, Copenhagen.

Pretzel, B. 2008. Now you see it, now you don't: lighting decisions for the Ardabil carpet based on the probability of visual perception and rates of fading. Pp. 759-763 in *Preprints of the ICOM-CC 15th Triennial Meeting, New Delhi, 22-26 September 2008.* Getty Conservation Institute and Allied Publishers, New Delhi.

Saunders, D. and J. Kirby. 2008. A comparison of light-induced damage under common museum illuminants. Pp. 766-774 in *Preprints of the ICOM-CC 15th Triennial Meeting, New Delhi, 22-26 September 2008.* Getty Conservation Institute and Allied Publishers, New Delhi.

Schmidt, A., P. Bronée, K. Kemp, and J. Fenger. 2001. *Airborne Dust in a Museum Environment.* Taken from: http://iaq.dk/iap/iap2001/2001_20.htm

Thorn, A. 2008. Vibration impact: methods and results of some recent studies. Pp. 783-90 in *Preprints of the ICOM-CC 15th Triennial Meeting, New Delhi, 22-26 September 2008.* Getty Conservation Institute and Allied Publishers, New Delhi.

Weintraub, S. 2003 *Demystifying Silica Gel*. Art Preservation Services, New York.

Weintraub, S. 2000. The color of white: is there a 'preferred' color temperature for the exhibition of works of art? *WAAC Newsletter* 21(3): 3 pp.

Also see: Strang and Image Permanence Institute (from the required texts) – any remaining chapters; and Stauderman & Tomkins on the museum preservation environment.

Sessions 5.1-2

Topics

Collagenous materials – sinew, gut, rawhide, tawed skin, tanned skin

Inorganic (non-metallic) materials – minerals, rocks/stone, pigments, glasses, glazes, ceramics,

Required Readings

Collagen

Szczepanowska – Chapter 7, pp. 169-182

Inorganic non-metals

Landry – Chapter 5

Szczepanowska – Chapter 9

Scanned Required Readings

Collagen

DeMouthe, J. 2006. Pp.122-133 in *Natural Materials: Sources, Properties, and Uses.* Elsevier, Amsterdam.

Haines, B.1991. Skin structure and leather properties. Pp. 1-4 in *Leather: Its Composition and Changes with Time* (C. Calnan and B. Haines, eds.). The Leather Conservation Centre, Northampton, UK.

Haines, B.1991. The structure of collagen. Pp. 5-9 in *Leather: Its Composition and Changes with Time* (C. Calnan and B. Haines, eds.). The Leather Conservation Centre, Northampton, UK.

Reed, R.1972. Table 1, p.47 in *Ancient Skins, Parchments, and Leathers*. Seminar Press, London.

Sykes, R. 1991. The principles of tanning. Pp. 10-11 in *Leather: Its Composition and Changes with Time* (C. Calnan and B. Haines, eds.). The Leather Conservation Centre, Northampton, UK.

Inorganic non-metals

Buys, S. and V. Oakley. 1993. The deterioration of ceramics. Pp. 18-28 in *The Conservation and Restoration of Ceramics.* Butterworth-Heinemann, Oxford.

Craft, M. 1992. Decorative arts. Pp. 96-102 in *Caring for Your Collections* (A. Schultz, ed.). National Institute for Conservation and Harry N. Abrams, NY.

Newton, R. and S. Davidson. 1989. Deterioration of glass. Pp.135-164 in *Conservation of Glass.* Butterworths, London.

Oakley, V. and K. Jain. 2002. Care of ceramic objects (Chapter 3). Pp. 19-30 in *Essentials in the Care and Conservation of Historical Ceramic Objects*. Archetype Publications, Ltd., London.

Wheeler, G. 1992. Stone objects. Pp. 122-127 in *Caring for Your Collections* (A. Schultz, ed.). National Institute for Conservation and Harry N. Abrams, NY.

Scanned Supplemental Readings

Collagen

Pool, M.1977. Preliminary analysis of the effects of cold storage on fur garments and mammal skins. *Collection Forum* 13(1):25-39.

Thomson, R.1991. A history of leather processing from the medieval to the present time. Pp. 12-15 in *Leather: Its Composition and Changes with Time* (C. Calnan and B. Haines, eds.). The Leather Conservation Centre, Northampton, UK.

von Endt, D.1984. Protein structure. Pp. 1-9 in *Protein Chemistry for Conservators* (C. Rose and D. von Endt, eds.). American Institute for Conservation, Washington, DC.

von Endt, D.1984. Collagen. Pp. 10-17 in *Protein Chemistry for Conservators* (C. Rose and D. von Endt, eds.). American Institute for Conservation, Washington, DC.

Inorganic Non-metals

Blount, A. 1993. Nature of the alterations which form on pyrite and marcasite during collection storage. *Collection Forum* 9(1): 1-16.

Buys, S. and V. Oakley. 1993. The technology of ceramics. Pp. 3-17 in *The Conservation and Restoration of Ceramics.* Butterworth-Heinemann, Oxford.

Doehne, E. and C. Price. 2010. *Stone Conservation: An Overview of Current Research.* 2nd edition. Getty Conservation Institute, Los Angeles.

Fielden, B. 1994. Climatic causes of decay. Pp. 90-130 in *Conservation of Historic Buildings.* Butterworth-Heinemann, Oxford.

Fitzhugh, E. and R. Gettens. 1971. Calclacite and other efflorescent salts on objects stored in wooden museum cases. Pp. 91-102 in *Science and Archaeology* (R. Brill, ed.). 4th Symposium on Archaeological Chemistry, Atlantic City, 1968. MIT Press, Cambridge, MA.

Howie, F. 1992. Elements, alloys, and miscellaneous minerals. Pp. 51-55 in *The Care and Conservation of Geological Materials.* Butterworth-Heinemann, Oxford.

Nassau, K. 1992. Conserving light sensitive minerals and gems. Pp. 11-24 in *The Care and Conservation of Geological Materials.* Butterworth-Heinemann, Oxford.

Winkler, E. 1982. Problems in the deterioration of stone. Pp. 108-119 in *Conservation of Historic Stone Buildings and Monuments.* National Academy Press, Washington, DC.

Sessions 6.1-2

Topics

Plant materials

Synthetic materials (plastics)

Required Texts

Plant materials

Landry – Chapters 3, 4, 9, and11

Szczepanowska – Chapter 6

Synthetic materials

Szczepanowska – Chapter 10

Scanned Required Readings

Plant materials

Hatch, K. 1993.Cotton fiber. Pp.162-171 in *Textile Science*. West Publishing Company, St. Paul.

Hatch, K. 1993. Specialty cellulosic fibers. Pp.172-179 in *Textile Science*. West Publishing Company, St. Paul.

Williams, M.1990. Pp.13-22 in *Keeping It All Together: The Preservation and Care of Historic Furniture*. 2nd ed. Ohio Antique Review, Inc., Worthington, IL.

Synthetic materials

Image Permanence Institute. 2011. *Preserving Film-based Photographic Collections*. 2 pp.

Nishimura, D. 1995. Film supports: negatives, transparencies, microforms, and motion pictures, and appendices. Pp. 365-393 in, *Storage of Natural History Collections: A Preventive Conservation Approach* C. Rose, C. Hawks, and H. Genoways, eds.). Society for the Preservation of Natural History Collections, Iowa City.

Shashoua, Y. 2008. Pp. 193-225 in *Conservation of Plastics: Materials Science, Degradation, and Preservation.* Butterworth-Heinemann, Burlington, MA.

Tsang, J. 2010. Safe handling of plastics in a museum environment. *WAAC (Western Association for Art Conservation) Newsletter* 32(2):17-22.

Van Oosten, T., and A Laganá. 2010. A taste of plastics. C*ontemporary Art Who Cares II.* Workshop, 9-11 June 2010, Amsterdam.

Required Web Sites (review to understand range of content)

Plant Materials

Murray, C. R. Kaczkowski, B. Pouliot, G. Laurin, and V. Schussler (eds.) 2015. *Plant Materials*. AIC Objects Specialty Group Wiki. http://www.conservation-wiki.com/wiki/Plant_Materials

Synthetic Materials

Image Permanence Institute Web site on preservation of photographic materials
http://imagepermanenceinstitute.org

Modern Plastics. Web page on identification of plastics
http://www.modernplastics.com/how_to_identify_plastics.htm

Scanned Supplemental Readings

Plant materials

Boorstein, J. 1998. Interior woodwork. Pp. 140-151 in *Caring for Your Historic House.* Harry N. Abrams, New York.

Hamburg, D. 1992. Library and archival collections. Pp.52-63 in *Caring for Your Collections*. Harry N. Abrams, New York.

Landi, S. 1992. Technology. Pp. 8-27 in *The Textile Conservator's Manual*. Butterworth-Heinemann, Oxford.

Norton, R. 1990. The technology of plant materials used in artifacts. Pp. 83-138 in *The Conservation of Artifacts Made from Plant Materials.* J. Paul Getty Trust, Los Angeles.

Synthetic materials

Blank, S. 1990. An introduction to plastics and rubbers in collections. *Studies in Conservation* 35:53-63.

Fenn, J. 2001. Plastic beads and buttons in social history collections: a dilemma. Pp. 53-63 in *Ethnographic Beadwork: Aspects of Manufacture, Use and Conservation* (M. Wright, ed.). Archetype Publications, London.

Loadman, M. 1991. Rubber: its history, composition and prospects for conservation. Pp. 65-73 in *Saving the Twentieth Century: The Conservation of Modern Materials* (D. Grattan, ed.). Canadian Conservation Institute, Ottawa.

Morgan, J. 1991. Pp.14-34 in *Conservation of Plastics.* Plastics Historical Society and The Conservation Unit, Museums & Galleries Commission, London.

Quye, A. and B. Keneghan. 1999. Degredation. Pp. 111-135 in *Plastics: Collecting and Conserving* (A. Quye and C. Wiliamson, eds.). NMS Publishing Ltd., Edinburgh.

Reilly, J. 1991. Celluloid objects: their chemistry and preservation. *JAIC* 30(2): 145-162.

Rémillard, F. 2007. *Identification of Plastics and Elastomers: Miniaturized Tests*. Centre De Conservation Du Québec, Quebec.

Williams, S. 2002. Care of plastics: malignant plastics. *WAAC (Western Association for Art Conservation) Newsletter* 24(1):10-15.

Supplemental Web Sites

Plant materials

AIC Objects Specialty Group Wiki
http://www.conservation-wiki.com/index.php?title=Wood

Synthetic materials

Plastics History. 2001. Web document from http://www.mindfully.org/Plastic/Plastics-History.htm
Tanagram Technology Ltd. Identification of plastics tests
http://www.tangram.co.uk/TI-Polymer-Identification_of_plastics.html
University of Illinois Library. *Preservation Self-Assessment Program*. http://psap.library.illinois.edu/
Format Guide and Glossary - particularly useful for identification of various photographic and sound recording media.

Sessions 7.1-2 Conservation Laboratories Tour at National Gallery of Art

Sessions 8.1-2

Topics
Keratins, fibroin, chitin
Inorganic materials-Metals

Required Texts
Kertains,fibroin, chitin
Szcepanowska – Chapter 7, 187-201
Metals
Landry – Chapter 8
Szcepanowska – Chapter 8

Scanned Required Readings
Keratins/fibroin
Hatch, K. 1993. Silk fibers. Pp.154-161 in *Textile Science*. West Publishing Company, St. Paul.
Hatch, K. 1993. Wool fibers. Pp.141-153 in *Textile Science*. West Publishing Company, St. Paul.
Minnesota Historical Society, n.d. *Quills, Horn, Hair, Feathers, Claws, and Baleen.* Minnesota Historical Society, Minneapolis, MN.
Metals
Drayman-Weisser, T. 1992. Metal objects. Pp. 107-121 in *Caring for Your Collections*. Harry N. Abrams, New York.
Eggert, G., A. Wollmann, B. Schwahn, E. Hustedt-Martens, B. Barbier, and H. Euler. 2008. When glass and metal corrode together. Pp. 211-216 in *Preprints of the ICOM-CC 15th Triennial Meeting, New Delhi, 22-26 September 2008.* Getty Conservation Institute and Allied Publishers, New Delhi.
Selwyn, L. 2004. Metals, corrosion, and specific corrosion problems, pp. 5-34, and Glossary, pp. 195-207, in *Metals and Corrosion: A Handbook for the Conservation Professional.* Canadian Conservation Institute, Ottawa.
Tennent, N., B. Cooksey, D. Littlejohn, B. Ottaway, S. Tarling, and M. Vickers. 1993. Unusual corrosion and efflorescence products on bronze and iron antiquities stored in wooden cabinets. Pp. 60-65 in *Conservation Science in the UK* (N. Tennent, ed.). James & James, London.

Required Web Site (review to understand range of content)
Keratins
The Feather Atlas http://www.lab.fws.gov/featheratlas

Scanned Supplemental Readings
Keratins, fibroin
Carlee, E. 2011. The Alaska fur ID project: a virtual resource for materials identification. *AIC Objects Specialty Group Postprints* 18:149-171.
Cook, J. 1993. Silk. Pp. 144-165 in *Handbook of Textile Fibres*. Merrow, Durham, UK.
Halstead, L.1974. Keratinaceous hard tissues. Pp.94-102 in *Vertebrate Hard Tissues.* Wykeham Publications, London.
Lauffenburger, J. 1993. Baleen in museum collections: its sources, uses, and identification. *JAIC* 32(3):213-230.

Lennox, F. and R. Rowlands. 1969. Photochemical degradation of keratins. *Photochemistry and Photobiology* 9:359-367.

Needles, H. 1984. Keratins and fibroin. Pp. 18-24 in *Protein Chemistry for Conservators* (C. Rose and D. von Endt, eds.). American Institute for Conservation, Washington, DC.

Pearlstein E. and L. Keene. 2009. Fading behavior of red-shafted flicker feathers. Powerpoint presentation from the conference, *Scraping Gut and Plucking Feathers,* 6 October, 2009, York, England.

Metals

Boissonnas, V. *2006 An Introduction to the History of Metals Conservation*. Powerpoint presentation. Metals Conservation Summer Institute, 27 May – 7 June 2006, Worcester, MA.

Bray. W. 1993. Techniques of gilding and surface-enrichment in pre-Hispanic American metallurgy. Pp. 182-192 in *Metal Plating and Patination* (S. La Niece and P. Craddock, eds.). Butterworth-Heinemann, Oxford.

Oddy, A. 1993. Gilding of metals in the Old World. Pp. 171-181 in *Metal Plating and Patination* (S. La Niece and P. Craddock, eds.). Butterworth-Heinemann, Oxford.

Raub, C. 1993. The history of electroplating. Pp. 284-290 in *Metal Plating and Patination* (S. La Niece and P. Craddock, eds.). Butterworth-Heinemann, Oxford.

Supplemental Web site

Metals

Philadelphia Museum of Art. 2015. Finishing techniques in metalwork. http://www.philamuseum.org/booklets/7_41_71_1.html?page=1

Sessions 9.1-2

Topics

Natural composites (intimate mixtures of organic and inorganic components in which the properties of the resulting material are dependent upon both components – bone, teeth/ivory, shell, eggshell)

Complex or mixed media objects

Required Texts

Natural composites

Szczepanowska – Chapter 7, pp. 182-187

Complex or mixed media

Landry – Chapters 7, 10, and 12

Scanned Required Readings

Natural composites

Halstead, L. 1974. Bone. Pp. 64-72 in *Vertebrate Hard Tissues.* Wykeham Publications, London.

Tennant, N. and T. Baird, 1985. The deterioration of mollusk collections: identification of shell efflorescence. *Studies in Conservation* 30:73-85.

Williams, S. 1991. Investigation of the causes of structural damage to teeth in natural history collections. *Collection Forum* 7(1):13-25.

Complex or mixed media

Odell, S. 1992. Musical instruments. Pp. 128-137 in *Caring for Your Collections.* Harry N. Abrams, New York.

Required Web Sites (review to understand range of content)

Natural composites

Identification Guide for Ivory and Ivory Substitutes. National Fish & Wildlife Service Forensic Laboratory. http://www.lab.fws.gov/ivory.php

Researching Ivory – links to a host of resources regarding ivory, http://www.ebur.eu/index.php?q=1&s=0&t=1

Supplemental Readings

Natural composites

Agnew, N. 1981. The corrosion of egg shells by acetic acid vapor. *ICCM Bulletin* 7(4):3-9.

Halstead, L. 1974. Scale and tooth dentine. Pp. 80-85 in *Vertebrate Hard Tissues.* Wykeham Publications, London.

McGregor, A. 1985. Pp.1-29 in *Bone, Antler, Ivory and Horn*. Croom Helm, Ltd., Beckenham, UK.

von Endt, D. pp.13-17 and 31-35 in *Protein Chemistry for Conservators* (C. Rose and D. von Endt, eds.). American Institute for Conservation, Washington, DC.

Mixed media

Craft, M. 1992. Decorative arts. Pp. 96-102 in *Caring for Your Collections* (A. Schultz, ed.). National Institute for Conservation and Harry N. Abrams, NY.

Session 10.1-2

Topics

Materials testing & lab safety

Selecting storage and exhibit materials for collections – chemical and physical properties, additives

Required Texts (distributed via email or on Blackboard)

Materials testing/lab safety

Packet on Laboratory Testing distributed by the course instructors on Blackboard

Selecting materials

Szczepanowska – Chapter 4

Scanned Required Readings

Materials testing/lab safety

American Chemical Society.2006. Safety for Introductory Chemistry Students. American Chemical Society, Washington, DC.

Coughlin, M. 2011. *Monitoring Acidic Off-gassing of Plastics*. NPS Conserve O Gram 8(5). National Park Service, Washington, DC.

Garside, P. and O. Walker. 2015. The formation of microenvironments in polyester enclosures. *Journal of Conservation and Museum Studies* 13(1): 1-4. (includes discussion of use of AD strips in materials testing).

Nishimura, D. 1995. Appendices. Pp. 384-393 in, *Storage of Natural History Collections: A Preventive Conservation Approach* C. Rose, C. Hawks, and H. Genoways, eds.). Society for the Preservation of Natural History Collections, Iowa City.

Thickett, D. and L. Lee. 2004. *Selection of Materials for the Storage and Display of Museum Objects.* British Museum Occasional Paper Number 111. British Museum, London.

Selecting materials

ANSI/NISO. 2001. *Guidelines for Information about Preservation Products*. ANSI/NISO Z39.77-2001, ANSI, Bethesda, MD.

Hatchfield, P. 2004. Pollutants in the museum environment: practical strategies for problem solving in design, exhibition and storage. *WAAC Newsletter* 26(2):10-22.

Rossol, M. 2014. Are water-based paints better than solvent-based? *ACTS Facts* 28(12):1-2.

Williams, S. 1999. Plastics for storage and display. Pp. 99-104 in *Plastics: Collecting and Conserving* (A. Quye and C. Wiliamson, eds.). NMS Publishing Ltd., Edinburgh.

Required Web site (review to understand range of content)

American Institute for Conservation. 2015. Databases of tested materials. http://www.conservation-wiki.com/wiki/Conservation_Materials

Scanned Supplemental Readings

Selecting and Testing Materials

Hawks. C. and L. Booth 2007. *Selecting Storage Furniture and Storage Materials for Museum Collections.*

Library of Congress Preservation Directorate. 2009. *Specifications for Polyester: Poly(ethylene-terephthalate) Film for the Storage of Artifacts.* Specification number 500-500-09. Library of Congress. Washington, DC.

Smithsonian Institution Archives. 2010. *Selected Vendors of Preservation Supplies*

Williams, S., A. Brooks, S. Williams, and R. Hinrichs. 1998. *Guide to the Identification of Common Clear Plastic Films.* SPNHC Leaflet No.3. Society for the Preservation of Natural History Collections.

Sessions 11.1-2 and 12.1-2 (BRING INDIRECTLY-VENTED SAFETY GOGGLES AND HAND LENSES)

Topic

Laboratory class - Materials testing

Required Texts for lab classes

Laboratory Packet distributed by the instructors

Required Readings for both lab classes

All Required Readings on Selecting Materials and on Materials Testing & Lab Safety from Session 10

Sessions 13.1-2

Topics

Cultural sensitivity in collections care

Selecting and working with a conservator

Scanned Required Readings

Cultural Sensitivity

Clavir, M. 2002. Pp. 245-249 in *Preserving what is Valued.* University of British Columbia Press, Vancouver, BC.

Newsome, S. 2004. Personal reflections on the preservation and interpretation of African-American religious and spiritual traditions. Pp. 27-32 in *Stewards of the Sacred* (L Sullivan and A. Edwards, eds.). American Association of Museums and Center for Study of World Religions, Harvard University, Washington, DC.

Pearlstein, E. et al. n.d. *Western Science Seeks Cultural Knowledge.* Agua Caliente Cultural Museum, UCLA Getty Online Exhibit.

Thomas, J. 2004. Handling considerations: one person's story. Pp. 7-10 in *Caring for American Indian Objects: A Practical and Cultural Guide.* Minnesota Historical Society, St. Paul, MN.

Selecting a Conservator

AIC Qualifications Task Force. 2003. *Defining the Conservator: Essential Competencies*. American Institute for Conservation, Washington, DC.

Sturman, S. 1992. Obtaining professional conservation services. Pp. 195-201 in *Caring for Your Collections.* Harry N. Abrams, New York

Required Web Site

Cultural Sensitivity

Canadian Conservation Institute. 2016. *Caring for Sacred and Culturally Sensitive Objects.* http://canada.pch.gc.ca/eng/1448995219999

Sessions 14.1-2

PRESENTATIONS FOR CLASS and PAPERS DUE (2 hardcopies to instructors)

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