

# A CURRICULUM FOR THE EDUCATION OF CONSERVATORS OF ISLAMIC MANUSCRIPTS

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## INTRODUCTION

Educational opportunities available to conservators of Islamic manuscripts are extremely restricted, despite the vast number of existing manuscripts and their cultural importance. In Europe and North America, when training is offered in manuscript conservation it is primarily directed towards Western manuscripts. In other parts of the world, where the largest holdings of Islamic manuscripts are, many of the people responsible for the treatment of these collections have insufficient access to conservation education: sometimes no formal conservation programs are available or the methodologies and materials used are outdated. But often these individuals can afford neither the time nor the money required to attend conservation programs in Europe and North America. Indeed, many cannot obtain the necessary visas to study in the West, even with adequate financial support. And if they overcome all these obstacles, then like other conservators in the European and North American programs, they are taught about Western manuscripts rather than Islamic ones.

Following graduation, training prospects for these conservators do not improve. Those working with Islamic manuscript collections in European and North American institutions struggle to gain sufficient expertise and understanding to be able to treat these complex objects. As Western manuscripts have fundamentally different structures than Islamic ones, the treatment of Islamic manuscripts must be based on a deep understanding of how they were made and used. The inappropriate application of approaches used for Western manuscripts can cause considerable harm to their Islamic counterparts. Meanwhile, conservators elsewhere are forced to depend on whatever limited means and information are available to them. Without a strong understanding of conservation principals and the materials and techniques that have become the international standard, conservators can, however unwittingly, damage the manuscripts in their care rather than enhancing their preservation.

There are several different needs then which had to be addressed by this curriculum. What are the competencies, skills, techniques and materials that conservators need to know in order to treat Islamic manuscripts? How can a high standard of education in Islamic manuscript conservation be made available to individuals who presently have little or no access to it but who are responsible, nonetheless, for treating these manuscripts? Can delivery of this education be organized pragmatically and made flexible enough so that conservators-in-training do not have to leave their jobs and homes for extended periods in order to acquire it? At the same time, can a formal two-year program of education in Islamic manuscript conservation be offered in a university setting which is more affordable and more accessible to students from Islamic countries?

The curriculum was thus designed to be delivered in a full-time two-year program, which is thought to be the minimum amount of time needed to teach the basic needs of starting conservators of Islamic manuscripts. Alternatively, however, for those unable to attend such a program, it is envisioned that it could also be taught in semi-independent modules. These modules could be taken singly to libraries, museums or manuscript-holding institutions and taught on-site to the personnel there. Delivered consecutively, the cumulative instruction of all the modules would lead to the same result as the two year program of education although spaced out over a longer period of time, with intervals between each module, as funding and interest permit.

An extensive bibliography is provided with which any instructor should be very familiar. However, it is the authors' experience that the students most likely to be involved in this educational program may not have the linguistic skills or prior exposure to academic literature to be able to use the bibliography

without direction. The authors recommend that instructors chose a small number of readings for each modular unit and teach the students how to extract information from them. The readings should, therefore, be selected according to the needs and abilities of each particular group of students, as well as for the relevance to the concepts being taught.

A two year period of teaching is limited and the program therefore focusses on basic knowledge of the materials found in Islamic manuscript collections, and general conservation concepts such as documentation, preventive conservation and remedial treatment. It also includes sufficient opportunity to practice manual skills. Yet, depending on the specific group of students or the geographic location where the program is being taught, the basic needs may vary. The curriculum is not prescriptive and when a different focus is needed in a specific situation, it is of course open to changes.

The International Islamic University of Malaysia (IIUM) and The Islamic Manuscript Association (TIMA) partially supported the development this curriculum. Nonetheless, they are not responsible for the ideas expressed in it. The merits and defects of the curriculum are solely the responsibility of the authors. As stated above, the authors do not intend the curriculum to be seen as some kind of prescriptive and final statement. Parts of the curriculum have been used by them with success, but if it is ever implemented in total, necessary modifications will certainly become apparent. They believe strongly that instruction will have to be adapted to the needs and circumstances of different institutions in different places. Rather, it is a first attempt to formulate ideas and a new approach to how the educational needs of Islamic manuscript conservators can be better met. It is a resource to be used as a springboard for discussion and to encourage others to add to it or to produce curricular models of their own. The authors would welcome feedback and suggestions about how it can be improved.

## **CURRICULUM OVERVIEW**

The ideal class size would probably be eight students. Although ten students could be accommodated, if necessary, twelve would be the maximum that could be handled in this program of study without a significant reduction in the individual attention they would get from the instructor(s) and a consequent loss in what they would learn from the training.

An instructional day is assumed to be six hours—three in the morning and three in the afternoon. Additionally, students would have assignments and projects that they would complete in their own time.

The curriculum has been planned in English, and it is assumed that the language of instruction will be English. Accordingly students need to have the necessary background to be able to understand English and express themselves in that language both in speaking and writing. Articles and books cited in the bibliography are also in English and these are an important resource for students to be able to use.

In the event that students are not sufficiently proficient in English, the program can be adapted in two possible ways. First, if a qualified instructor can be found who can teach in another language, that can be the language of instruction. Second, the instructor can teach in English and an interpreter translates the lesson into another language. In this case, the time necessary for instruction will probably double. Additionally, in both of these cases, students will be unable to access or use the bibliography and there will be a consequent significant loss in what they learn and how they perform later as conservators.

## **Authorship and Copyright: Usage of the Curriculum for the Education of Conservators of Islamic Manuscripts**

It is the authors' perception that this document represents a starting point for a larger discussion in the community of people who deal with Islamic manuscripts and hope that it may help initiate a process that leads to improved education for conservators of these manuscripts.

- The authors expect that the actual teaching of this curriculum will lead to many modifications, adaptations and improvements in it and that the present document is intended to be viewed as a resource, not some prescriptive and definitive statement.
- The curriculum cannot be used for commercial purposes.
- Anyone using the curriculum must credit the authors and the institutions which supported its development.
- Anyone can adapt the curriculum as he/she sees fit, but only if he/she allows free access to their adaptations by others.
- Without being involved in the implementation of the curriculum, the authors have no responsibility for the outcomes of any program or course which uses it.
- By the same token, neither TIMA nor IIUM has any responsibility for the ideas presented in this curriculum, which are the authors' own. These institutions advocate increased and better educational opportunities for conservators of Islamic manuscripts and greater access to such training. Accordingly they have supported the development of this curriculum and its dissemination as a way to promote discussion on the subject among those who are interested. Other curricula could be devised and other approaches used in fostering educational opportunities, so anyone taking ideas from this curriculum should feel free to adapt what he/she finds useful and to leave the rest.

Anyone reading or using the curriculum is encouraged to contribute their ideas and suggestions, for which they can then be given credit.

## **YEAR 1: General program outline**

### Assumptions:

- A group of individuals is identified by a manuscript-holding institution as present or would-be Islamic manuscript conservators or are entrants in a university conservation program. If the individuals apply to the program without prior conservation experience, they should have previously completed a 2 year program at the university level.
- The minimal equipment and materials identified as necessary for the program will be purchased by the manuscript-holding institution or university in which the program is taught.
- Manuscript material is available for students to examine and consider theoretically.
- The first-year program consists of seven modules, each module of four week duration, which are taught sequentially and build on each other. These are: 1) Ethics and Documentation; 2) Materials 1 – Paper; 3) Materials 2 – Leather and Adhesives; 4) Codicological Aspects; 5) Preservation; 6) Conservation Techniques and Materials 1; 7) Conservation Techniques and Materials 2.

### Result:

- At the end of the first-year program, the students have the theoretical knowledge and background to begin to undertake actual manuscript treatments in the second year. Although some simple repairs have been practiced, the students at the end of the first year are not yet adequately trained to work as conservators because the curriculum cannot yet include the opportunity and support to carry out treatments with supervision until appropriate theoretical background has been supplied.
- The modules in the first year can be taken in a continuous sequence in a university setting so that the students complete the training in one academic year. Or, the modules can be taken sequentially but with intervals between them--the interval determined by a manuscript-holding institution which sponsors the training. The modular nature of this educational approach allows for each unit to be brought to such an institution and carried out in a relatively short amount of time; the next module can then be undertaken when time and funds are available and need is felt by that institution.

### If assumptions are not accurate:

- No manuscript material is available for students to examine and consider theoretically.
- Minimal equipment and materials are not available at the manuscript-holding institution or university in which the program is taught.
- The seven modules in the program are not sequentially taught.
- The seven modules in the program are not all taught.

### Result:

- The students lack the necessary knowledge and experience to begin to undertake actual treatments.
- The students lack the necessary equipment and materials with which to carry out proper treatments.

### Instructor responsibilities:

- Evaluation is given by the instructor(s) to the students as to whether each module was successfully completed:
- A report is given by the instructor to the university or manuscript-holding institution, specifying whether the necessary equipment, materials, space, and time was provided for the module to be taught fully and properly. In the event that some deficiencies existed, the instructor will not certify that the module has been successfully completed. Therefore, going on to the next module will have limited utility and the final result will be students who are not ready to undertake actual treatments, even with supervision.

## **YEAR 2: General program outline**

### Assumptions:

- Local manuscript-holding institutions have manuscript materials which they make available for students to work with and treat. The institutions have real needs as related to their manuscript collections that students can assess and begin to address. There are also on-going projects in these institutions, with budgetary support from the institutions for their own projects, in which students can get involved.

### Result:

- Students have a full program which includes hands-on treatment, exhibition and preservation components and development of advisory skills.

### If assumptions are restricted:

- There is manuscript material available for students to treat but it may not be from local institutions. For example, a limited number of manuscripts for the students to treat may be purchased by the university. So the real needs of manuscript-holding institutions are not addressed and assessed by the students during their training. Additionally, there may be no local institutions with on-going projects and/or no budgetary support for these projects.

### Result:

- Students have a limited program which includes more time spent on treatment and only theoretical exhibition and preservation components.

### If assumptions are not accurate:

- There is no manuscript material available for students to work on. There are no local manuscript-holding institutions in which students can get involved.

### Result:

- There is no second-year program.
- Trainees are not adequately educated to work as conservators when they complete the first 7 modules of the first year program.

Instructor responsibilities:

- Evaluation is given by the instructor(s) to the students as to whether each project was completed successfully.
- A report is given by the instructor(s) to the university or manuscript-holding institution, describing each student's projects and whether they were successfully completed. In the event that any project is incomplete the instructor(s) will not confirm that the student has successfully completed the training program.

# **Conservation of Islamic Manuscripts: an outline of concepts, topics, skills and competencies to be taught**

## **CONSERVATION**

### **Conservation ethics**

#### **Active conservation principles**

- Reversibility
- Tested materials
- Continuing research

#### **Passive conservation principles**

- Storage conditions
- Light conditions
- Humidity conditions
- Pollution control
- Handling
- Disaster planning

### **Examination**

- Macroscopic examination under normal light
- Macroscopic examination under raking light
- Macroscopic examination under transmitted light
- Macroscopic examination under UV radiation
- Macroscopic examination under IR radiation
- Microscopic examination
- Polarized light microscopy
- Electron microscopy
- Other chemical tests

### **Documentation**

- Writing condition reports
- Writing treatment proposals
- Making documentation photography with normal, transmitted and raking light
- Writing a daily journal during treatment
- Writing treatment reports

### **Chemical materials and microorganisms dangerous to the health**

## Flammable and explosive materials

- Safety measures

## Measures to be undertaken when moving objects

### Damage

- Damage and preventative measures to be taken
- Evidence of types of damage
- Reasons for damage
- Biological damage
  - Microorganisms
    - Mold and fungus
    - Bacteria
    - Insects
      - Special characteristics of insect damage
      - Insect attack
- Physical agents of damage
  - Light
    - The damaging effects of visible light
    - The damaging effects of UV light
    - Preventative measures to counter the effects of sunlight and UV
  - Humidity
    - The effects of humidity in storage
    - The control of humidity
    - The removal of humidity from objects and methods of disinfection
  - Temperature
    - The damaging effects of temperature fluctuations
- Chemical agents of damage
  - The effects of soiling and staining
  - Acidity
  - Air pollution
    - The effects of ink and the damages it causes
    - The effects of different paints and the damages they cause
    - The effects of adhesives and the damages they cause
      - Natural adhesives (sources, physical and chemical characteristics, preparation, removal, appearance, pH, aging characteristics)
        - Plant sources
        - Animal sources
      - Semi-synthetic adhesives (sources, physical and chemical characteristics, preparation, removal, appearance, pH, aging characteristics)
      - Synthetic adhesives (sources, physical and chemical characteristics, preparation, removal, appearance, pH, aging characteristics)

## **Exhibition**

- General environmental conditions
- Moving artwork
- Creating mounts and supports
- Case environment
- Tracking pieces on exhibition
- Record keeping

## **THE MATERIALS IN AN ISLAMIC MANUSCRIPT**

### **Paper**

- Paper History
  - Paper before Islam
  - Evidence of paper in Central Asia just prior to Islam
  - Theories of the passage of paper to Islamic civilization
- Developments in Papermaking Technology
  - Theories of the first paper moulds (laid and wove) and papermaking techniques
- Paper in the Islamic World
  - The spread of paper with the Islamic conquests
  - Characteristics of early papers in Eastern Islam
    - Laid lines
    - Chain lines
    - Deckle edge
    - Paper dimensions
    - Pulp characteristics
    - Paper thickness
    - Sizing agents
  - Characteristics of early papers in Western Islam
    - Zigzag marks
    - Laid lines
    - Chain lines
    - Deckle edge
    - Paper dimensions
    - Pulp characteristics
    - Paper thickness
    - Sizing agents
    - Tinting
  - Technical advances in papermaking
  - Characteristics of later papers in Eastern Islam
    - Laid lines
    - Chain lines
    - Deckle edge

- Paper dimensions
  - Pulp characteristics
  - Paper thickness
  - Sizing agents
  - The spread of paper to Europe
  - The spread of European paper to Islamic countries and the collapse of Islamic papermaking
- Papermaking Techniques
  - The different papermaking and paper finishing techniques in the Far East, Islam and Europe
  - Historical information from primary sources
  - Information from physical evidence
- Writing, Illuminating and Painting Materials
  - Writing tools and their effect on papermaking
  - Arabic script and its effect on papermaking
  - Different inks and their characteristics
  - Historical information about writing and writing materials
  - Different paints and their characteristics
  - Historical information about paints and illuminating materials
  - Information about writing, illuminating and painting materials from physical evidence
  - Decorative papers (marbling, sprinling, stenciling, cut-outs)
- Paper chemistry-cellulose chemistry
  - Cellulose monomers
  - Polymerization and the degree of polymerization
  - Hydrogen bonding and cellulose structure
  - Cellulose and its reactions with other molecules (water, dyes, oxidants, paints, ink, adhesives)
  - Cellulose fibers
  - Cellulose and paper direction
  - Plant wall structures
  - Characteristics of cellulose

### **Leather in the Islamic world**

- Leather making
- Historical information about leather
- Information about leather from physical evidence

### **Leather**

- Chemical structure
- Manufacture
- Historical information

- Conservation issues

## **Parchment**

- Chemical structure
- Manufacture
- Historical information
- Conservation issues

## **Painting and illumination**

- Chemical nature of the materials
- Characteristics of Islamic miniatures and illumination
- Conservation issues

## **Ink and writing**

- Chemical nature of the materials
- Characteristics of Islamic inks and writing
- Conservation issues

## **ISLAMIC MANUSCRIPT STRUCTURE**

### **Islamic manuscripts**

- Early codex structures
- Later codex structures
- Albums and levha
- Sewing
- Book formats
- Page forming
- Endbanding
- Spine lining
- Joining the textblock to the covers
- Cover decoration (outside and doublures)
- Bookbinding tools and materials
- Conservation issues
- Codicological research
- Comparison of the Islamic binding with other binding structures

## **CONSERVATION MATERIALS**

### **Important aging reactions and reversibility**

- Research and testing

### **Natural and synthetic adhesives and their conservation uses**

- Important characteristics according to the uses of the adhesives
- Mechanisms of film formation
- Structure and characteristics of adhesion

### **Synthetic adhesives**

#### **Introduction to other products used in conservation treatment**

- Paper and board
- Paint

### **NEW DEVELOPMENTS IN CONSERVATION**

- Introduction to recently published books and periodicals
- Introduction to new methods, techniques and materials
- Information about international courses and meetings for conservators

### **MANUSCRIPT CONSERVATION**

#### **Active paper conservation treatment methods**

- Washing
- Repairs
- Humidifying and flattening
- Filling losses
- Dry cleaning

#### **Active leather conservation**

- Tool sharpening
- Leather paring
- Leather dying
- Types of leather for conservation use
- Adhering leather
- Repairing leather
- Lifting adhered leather
- Leather surface treatments
- Cleaning leather
- Filling losses

### **Active parchment conservation**

- Humidifying and flattening
- Repairs
- Cleaning
- Surface treatments
- Filling losses
- Adhering

### **Active paint and illumination conservation**

- Examining painted surfaces
- Paint consolidation

### **Active ink and writing conservation**

- Examining writing surfaces
- Ink consolidation

### **Active manuscript conservation**

- Disbinding
- Constituting the gatherings
- Sewing
- Endbanding
- Spine lining
- Joining the textblock to the covers
- Cover construction

## DETAILED CURRICULUM DESIGN

### Year 1 Program:

The program is taught in 28 weeks total. It consists of the following seven modules.

#### MODULE 1: Ethics and Documentation

4 weeks total: 3 weeks with an instructor, 1 week working on assignments with long-distance supervision

#### TOPIC: Ethics

Suggested time for this topic: 1.5 weeks with an instructor, part of 1 week working on assignments with long-distance supervision

#### Key Concepts:

- Reversibility
- Integrity of the object
- Purpose for treatment
  - Different institutional expectations and requirements
  - Different cultural values
  - Budgetary issues
  - Urgency and uniqueness
- Point of departure is the authenticity of the object
  - What is authenticity?
  - Are changes that happen to a manuscript during its historical passage part of the manuscript's authenticity?
- Define Restoration, Conservation, Preservation
  - How are ethical issues reflected in these definitions?
- What variable weights should be given to a manuscript's historical value, cultural value, and financial value?
- How can the individual values of manuscripts be compared and determined?
- How can the value of a manuscript be determined in its original context and/or as part of a larger collection?
- What is the role of a conservator?
  - Decision making from individual treatments to collection management or from collection management to individual treatments?
  - Knowing personal limitations. Seeking outside knowledge/skills/expertise.

#### Applied Theory:

- Students read the AIC and Icon code of ethics for conservation.  
[http://www.icon.org.uk/index.php?option=com\\_content&task=view&id=121](http://www.icon.org.uk/index.php?option=com_content&task=view&id=121)  
[http://www.nps.gov/training/tel/Guides/HPS1022\\_AIC\\_Code\\_of\\_Ethics.pdf](http://www.nps.gov/training/tel/Guides/HPS1022_AIC_Code_of_Ethics.pdf)
- Students summarize in their own words the key ethical principles

- Given specific case study parameters, students identify ethical issues in each study

#### Assignments:

- Given a specific case study, each student individually identifies ethical issues in the study from different institutional perspectives
- Then with the addition of factors which directly impact any conservation decision, each student individually argues for a particular approach
- Given a real treatment that has taken place, each student individually argues for a different approach

#### Assessment:

- Each student submits a written report for each of the assignments which receive a grade that reflects his/her achievement of the desired outcomes.

#### Outcomes: Students are able to

- Know where to find the ethics and guidelines which govern the conservation profession
- Summarize in their own words key ethical principles
- Apply ethical principles to different situations and see how they can be dependent to a degree on context while still satisfying the core concepts

#### TOPIC: Documentation

Suggested time for this topic: 1.5 weeks with an instructor, part of 1 week working on assignments with long-distance supervision

#### Key Concepts:

- Purpose of documentation
  - Ethical codes governing documentation
  - Educating “the eye” and supporting the memory; building a personal databank of observations and possible solutions to conservation issues.
  - Informing others—colleagues, future users, care-takers of the object
  - Self-protection
- Basic conservation terminology applied to Islamic manuscripts
  - Use of the Lexicon of Terminology for Conservators of Islamic Manuscripts
- Compare a check-list condition report and a narrative condition report
  - Report design as a function of the use of the form i.e. general survey, condition survey, treatment proposal, etc.
- Documenting the physical identity of the manuscript
  - Recording any information known about author, date, provenance, etc.
  - Describing materials and construction including gathering structure
  - Noting what information or clues are given about the date, provenance and manufacture of a manuscript from the type of support, type of leather, type of inks and paints, etc.
  - Describing art historical styles: binding, textblock format, illustration, illumination, script

- Describing any unusual features or former repairs
- Describing condition (extent of damage) with some kind of severity rating
- Photographic documentation
  - What constitutes adequate photographic documentation?
  - Use of drawings to augment photography
  - Before- and after-treatment images and their purpose
  - Use of camera, tripod and lights
  - Safe-handling during photography
- Treatment proposal
  - The interaction of curatorial and conservation ratings to determine treatment priority
  - Based on identified condition issues and ethical considerations, a sequential and logical outline of what will be done during treatment.
  - Identifying any research, knowledge, materials that must be obtained prior to the actual treatment
- Making sure that the responsible authorities have fully agreed to all treatment steps and understand any risks involved.
- Recording and storing written and photographic documentation, making sure that it is and remains accessible to interested parties

#### Applied Theory:

- Collectively the class fills out a condition report form for a given manuscript with the instructor.
- Given a specific condition report form, each student will individually fill out the form while examining a given manuscript
- Each student individually takes 5 images of a given manuscript. The images to be taken will be specified by the instructor.
- Each pair of students produces a survey condition report form for a specified case study collection.
- Each student obtains a different sample condition report form used by some book-holding institution or private book conservator.

#### Assignments:

- Each student fully documents a manuscript in written and photographic form. This includes the manuscript's physical description and condition issues and proposes a treatment, with a discussion of the ethics involved in the treatment choices.

#### Assessment:

- Each student submits the full documentation for a given manuscript which receives a grade that reflects his/her achievement of the desired outcomes.

#### Outcomes: Students are able to

- Apply conservation terminology in the documentation of an Islamic manuscript
- Document in written and photographic form the physical identity and condition of a manuscript
- Write a sequential and logical treatment proposal which is informed by ethical considerations

## MODULE 2: Materials 1-Paper

4 weeks total: 3 weeks with an instructor, 1 week working on assignments with long-distance supervision

### Key Concepts:

- The constituent materials from which paper is made.
- The history of paper.
- The manufacture of Islamic paper.
- The manufacture of European hand-made paper.
- The manufacture of machine-made paper.
- The differences between Islamic and European hand-made papers, and between hand-made and machine-made papers.
- The differences over time in Islamic papers as a reflection of changes in technology and economics
- Other substrates encountered as supports: papyrus, parchment and dluwang.
- The macroscopic appearance of paper structure
- The microscopic appearance of paper structure
- The electron microscopic appearance of paper structure
  - Compare different papers – long and short fiber papers
  - Compare paper with and without filler
  - Compare paper structure before and after burnishing
- The molecular structure of cellulose – CHO backbone
  - Two- and three-dimensional models of cellulose molecular structure
  - Covalent bonding and polarity
  - Analogize inter-molecular connections with inter-fiber connections in electron micrographs
  - Intermolecular H-bonds and their strength (wet vs dry)
- Paper grain
- Paper burnishing
  - Sizes and their characteristics
- Colored papers
  - Use of the words “dyed” and “painted”
- Internal vice and external agents of deterioration
  - Carbohydrate as a nutrition source leading to insect attack
  - Example of an internal vice as a source of acid – lignin
  - Example of an external agent of deterioration which is a source of acid – environment, other manuscript materials.
- The decrease in fiber length and color changes as indicators of paper deterioration

### Applied Theory:

- Looking at a number of different handmade European and Japanese papers, students identify the following characteristics:
  - fiber content
  - weight (grammage)
  - thickness (measure it with a micrometer)
    - demonstrate the use of a micrometer
  - pulp distribution (floccular, homogeneous, etc)
  - fiber length
  - stiffness
  - fiber direction
  - laid lines and chain lines (measure their intervals and direction)
  - crackle
  - tear strength
  - wet tear strength
  - surface smoothness
  - any differences in the two surfaces
  - flexibility
- Using magnification and looking at a number of different handmade European and Japanese papers and actual manuscript papers, students identify:
  - surface morphology
  - effect of surface sizing and burnishing
  - absorption of water on sized and unsized paper (Possible experiment topic: effect of burnishing and sizing, either alone or in combination, on the absorption of water)
- Modelling carbohydrate inter-molecular attraction and micro-fibril structures with a thread analogy
- Students determine paper grain by touch and sight in different papers
- Students compare paper grain with the direction of laid and chain lines
- Student observe color changes across a page of paper and identify evidence of oxidation (either light- or chemically-induced)
- Students examine the flexibility/brittleness of different papers and note any correlation between these qualities and the condition of the paper

#### Assignments:

- Experiment: expansion of wet paper with and against the grain. Each pair of students will be given two strips of A4 photocopy paper of equal width and equal length (2.5 cm x 20.0 cm), to all appearances identical to each other. However, one strip will have been cut vertically from the photocopy paper, the other horizontally. Each team is to measure the length and width of these the two strips of paper they have been given. Then the strips are to be immersed in water for a couple of minutes until thoroughly wetted. Each team then measures the length and width of the two strips of wet paper. Data from all of the teams is collected. Each team is to write a lab report on the experiment: materials, procedure, results, and conclusions. In the conclusion section of

the report they are to try to account for the differential expansion of the two strips of paper.

- Each student describes why fiber direction is important in paper repair, and the longer the repair the more important the effect.
- Each student pair burnishes paper with an agate or shell and compares the behavior of the burnished and unburnished paper to ink, paint and water.

Assessments:

- Each student or student team submits a written report for each of the assignments which receive a grade that reflects his/her achievement of the desired outcomes.

Outcomes: Students are able to

- Demonstrate their knowledge of paper structure in accounting for the behavior of wet paper and the consequences for paper repair.
- Demonstrate their knowledge of paper structure in accounting for media behavior on burnished and unburnished papers.

## MODULE 3 – Materials 2 – Binding materials and adhesives

4 weeks total: 3 weeks with an instructor, 1 week working on assignments with long-distance supervision

### Key Concepts:

Materials from which a manuscript is made

- Introduction to the composite materials/composite structure of manuscripts
  - Thread
  - Cloth
  - Leather
  - Pasteboard
  - Decorated papers
  - Lacquer
- Sewing thread
  - Silk
  - Linen
  - Cotton
- Textile
  - Weave
  - Dye
  - Where they are used on a manuscript (spine lining, lining/doublure of fore-edge, board covering, doublure)
- Leather
  - Typical animal sources for the leather
  - Characteristics of leather from different animal sources
  - Physical characteristics of leather
  - Manufacturing of leather – tanning and tawing
  - Working the leather – dyeing, paring, finishing
  - Aging processes in leather
  - Deterioration factors – chemical, biological, mechanical and physical
  - Examining leather – with the naked eye, under magnification
- Decorated papers
  - Types of decoration – marbled, dyed, block-stamped, sprinkled, stenciled, etc.
  - Types of Islamic paper dyes and their characteristics
  - Preventative measures taken by Islamic manuscript makers to limit damaging agents in paper dyes
  - Different origins of decorated papers – local Islamic, imported

### Adhesives

- Adhesives used in Islamic manuscript making and historical repairing
  - Starch
  - Gum Arabic

- Asphodel
- Tragacanth?
- Mucilage
- Animal glue
- Egg white
- Other
- The purposes of adhesives in manuscript manufacture
  - Covering and assembling
  - Lining
  - Sizing and burnishing of paper
  - Binders in inks and paints
- Properties of adhesives
  - Strong adhesion
  - Weak adhesion
  - Flexibility
  - Sheen
- Adhesives used in conservation treatment
  - Starch
  - Methyl cellulose and its relatives
  - Klucel G and its relatives
  - Isinglass
  - Gelatin
  - Evacon
- Adhesives not to be used in conservation treatment
  - PVA and other white glues
  - Self-adhesive tapes and heat-set tissues
- The purposes of adhesives in conservation treatment
  - Repair
  - Re-sizing
  - Dissolution and removal
  - Consolidation
- Properties of adhesives
  - Reversibility
  - Strong adhesion
  - Weak adhesion
  - Flexibility
  - Sheen
  - Durability
  - Aging characteristics

Applied Theory:

- Given different leather samples, they are identified by type according to their different characteristics.
- Examining the use of materials on different manuscripts
- Identifying different types of decorated papers used in manuscripts
- Identifying different agents of deterioration in the leather found on manuscripts
- Preparing starch, Klucel G, Methyl cellulose, isinglass, gelatin
- Demonstrating the uses of different adhesives in conservation
  - Methyl cellulose used to adhere paper to paper
  - Methyl cellulose used to remove paper repairs from paper
  - Methyl cellulose used to size paper

#### Assignments:

- Given photo-documentation of a manuscript or a real manuscript, each student describes the materials used in the manuscript's manufacture and the types of damage that can be discerned in these materials.
- Each student adheres paper to paper using all of the conservation adhesives and PVA.
- Each student removes half of each paper sample used in the previous adhesion practicum
- Each student writes a report describing the behavior of each conservation adhesive and PVA, both as a fixing agent and in its effects on the substrate, and then its relative difficulty to remove. The student should also describe the properties of each adhesive which makes it appropriate or not for this purpose.

#### Assessments:

- Each student submits a written report for each of the assignments which receive a grade that reflects his/her achievement of the desired outcomes.

#### Outcomes: Students are able to

- Demonstrate their knowledge of the materials used in manufacture of an Islamic manuscript.
- Demonstrate their knowledge of the types of damage these materials may display.
- Demonstrate their knowledge of the types of adhesives used in conservation treatment and their properties and those not used in conservation treatment.
- Demonstrate the skills needed to make adhesives used in conservation treatment.

## MODULE 4 – Codicological Aspects of Islamic Manuscripts

4 weeks total: 3 weeks with an instructor, 1 week working on assignments with long-distance supervision

### Key Concepts:

#### The structure of a manuscript

- Assembly of a manuscript - textblock, sewing, covering
  - Composing the gatherings
  - Sewing the gatherings
  - Lining the textblock
  - Sewing the endbands
  - Making the covers
  - Attaching the covers

#### Textblock

- How the support is prepared - burnishing, ruling, lay-out, collation, etc.
- Manuscript transcription and illustration as a consequence of gathering structure and the use of catch words
- Inks and their characteristics
- Pigments and their characteristics
- Preventative measures used by Islamic manuscript makers to limit damaging agents in inks and pigments
- Differences in gathering structures
- The order of operations in preparing completed textblocks

#### Sewing

- Different sewing structures
- Purpose of the endband structures, primary and secondary

#### Lining

- Different lining materials
- Different attachments of the linings to the boards
- The dual function of a lining

#### Covers

- The making of the board cores
- Different techniques of covering the board cores
  - Two-piece full leather
  - One-piece full leather
  - Composite materials – partial leather, textile, lacquer, other
- Different methods of attaching the covers to the textblock
  - Two-piece technique
  - Built-on
  - Wrapper bindings
  - Inner joint options – doublures, pastedowns, guards, etc.

### Applied Theory

- The codicological aspects of different manuscripts (either real or through photographic images) are demonstrated and explained. This includes the textblock, the sewing, the lining, the covers and their attachment.
- Each student copies a simple manuscript textblock made of 3 quinions with 2 sentences per page and 3 interspersed illustrations.
- The instructor demonstrates how codicological information can be deduced from the evidence provided by a manuscript.
  - Number of sewing stations as a reflection of sewing type
  - Presence of repair patches as evidence of sewing type
  - Presence of holes as evidence of former sewing campaigns

Assignments:

- Given a real manuscript or the photographic documentation of one case study, each student describes all the codicological information that can be found.

Assessments:

- Each student submits a written report for the assignment which receives a grade that reflects his/her achievement of the desired outcomes.

Outcomes: Students are able to

- Demonstrate their knowledge of how a manuscript is assembled in logical, sequential order.
- Demonstrate their knowledge of different codicological features in Islamic manuscripts through careful observation and precise description.

## MODULE 5 – Preservation

4 weeks total: 3 weeks with an instructor, 1 week working on assignments with long-distance supervision

### Key Concepts:

- Concept of preservation, in relation to conservation
  - Preventive measures
  - Preventive strategies, advisory role and training
- Need for preservation
  - Agents of damage: natural aging, biological damage, chemical damage, mechanical damage
  - Optimizing preservation measures as a function of conservation policy
- Preservation in the direct environment of the object
  - Insect/pest control
  - Insect infestation control
  - Mold outbreaks
  - Disaster planning
  - Wrapping, boxing etc.
  - Environmental conditions
  - Storage materials, shelves, cupboards, book-ends and other supporting materials
  - Oddy testing
- Boxing
  - Advantages: environmental buffer, isolation layer to prevent soiling and pollution reaching the manuscript, isolation layer to help ward off insect/rodent attack, utility for labeling the object
  - Disadvantages: need for high quality boxing and wrapping materials, the inability to see what is going on inside the boxes/wrappers
- Preservation through careful handling
  - Handling in storage, both passive (position of the manuscripts on the shelves) and active
  - Handling in reading rooms, use of supports and other protective materials
  - Handling during transport, both inside an institute and outside, for loan traffic etc.
  - Handling during exhibition, use of supports and other supportive materials
  - Training of staff
  - Providing information to users
- Guidelines for exhibitions
  - Environmental conditions
  - Generally accepted standards of light and duration of exhibition period in relation to different materials
  - Supports and additional supportive materials
- Guidelines for digitization
  - Condition of the book as a factor in handling for digitization
  - Relative opening angles of manuscripts
  - Discussion of the status of the original manuscript after digitization
  - Different digitization equipment being used

### Applied Theory

- Students explore the availability of insect/pest control methods and materials in the region where the course is taught
- Students explore the availability, desirability from a conservation/preservation standpoint, and the environmental and human danger for different insect infestation control methods: anoxic treatment; insecticides; freezing; ignoring the problem
- Students identify the risks of disaster (fire, flood, civil disturbance, infestation, theft) in a given institution in the region where the course is taught.
- Students make a clam-shell box, a phase-box, a four-flap enclosure, a book cradle and book blocks.
- Students strap a manuscript into a custom-made cradle of their own manufacture.

### Assignments

- Students go to a local institution, identify possible risks of disaster, prioritize the danger according to some kind of probability analysis, make recommendations to the institution based on their risk analysis, and put a price tag on their recommendations.
- Students research the strict standards for environmental control in storage that have been in use for some time and the newer, more lax standards that are being discussed currently
- Students assess the physical conditions in some institution where manuscripts are stored (windows, doors, air circulation, security, handling, training, shelf materials, shelf design, hygiene, monitoring program, position of pipes in or near the storage area, location of the storage area in the building). Students make recommendations to this institution about improving physical storage conditions and put a price tag to their recommendations.
- Students assess the handling policies in a manuscript-holding institution (reading room guidelines, staff training, use of supports) and make recommendations to this institution about improving handling policies.
- Students research practices for how long and under what conditions manuscripts are exhibited in different institutions. Students compare these practices with recommended guidelines and make recommendations to the institutions.

### Assessment

- Each student submits a clam-shell box, a phase-box, a four-flap enclosure, a book cradle and book blocks.
- Each student correctly straps a manuscript into a custom-made cradle of his/her own manufacture.
- Each student submits a report analyzing possible risks of disaster in a local institution, prioritizing the dangers according to some kind of probability analysis and making recommendations to the institution based on the risk analysis with a price tag for implementing the recommendations. The report receives a grade that reflects his/her achievement of the desired outcomes.
- Each student submits a report identifying the strict standards of environmental control in storage that have been used for some time, the newer, more lax standards that are being discussed currently. The report compares the possible advantages and disadvantages of using

each set of standards. The report receives a grade that reflects his/her achievement of the desired outcomes.

- Each student submits a report assessing the physical conditions in some institution where manuscripts are stored and makes recommendations to the institution about improving these conditions, including a price tag for implementing the recommendations. The report receives a grade that reflects his/her achievement of the desired outcomes.
- Each student submits a report assessing the handling policies for a manuscript-holding institution and makes recommendations to the institution about improving these policies. The report receives a grade that reflects his/her achievement of the desired outcomes.
- Each student submits a report comparing different institutional practices for exhibition, comparing these practices with recommended guidelines and giving recommendations for improvement of these practices. The report receives a grade that reflects his/her achievement of the desired outcomes.

Outcomes: Students are able to

- Make boxes and supports appropriate for storage and exhibition.
- Articulate recommendations on a variety of preservation/conservation issues and address them to a manuscript-holding institution.
- Make a cost analysis and associated recommendations on a variety of preservation/conservation issues that are based in part on an understanding of how financial means impact policy implementation.
- Demonstrate in their reports an understanding of disaster planning, environmental standards for manuscript storage, physical conditions for manuscript storage, handling policies and exhibition practices from a preservation/conservation perspective.

## MODULE 6 – Conservation Techniques and Materials 1

4 weeks total: 3 weeks with an instructor, 1 week working on assignments with long-distance supervision

### Key Concepts:

- Brief review of conservation ethics – reversibility and the aims of intervention
- Brief review of adhesives used in conservation treatment
- Brief introduction to Japanese paper and its manufacture
- Repair papers and their qualities
  - Appropriate weight to be compatible with the substrate or for its repair function (swelling at spine folds)
  - Transparency – opacity
  - Strength
  - Stability
  - Manipulability
  - Flexibility
  - Surface appearance – color and texture
  - Durability
  - Fiber direction – paper grain
- Different types of paper treatment
  - Drycleaning
  - Washing
  - Tear repair
  - Filling losses
  - Resizing
  - Lining
  - Removal of old repairs
  - Coloring and retouching
  - Flattening
- Drycleaning
  - Properties of drycleaning powders, chemical sponges, erasers on support substrates
  - Using a brush or cloth
- Washing
  - Possible benefits: de-acidification and reduction of stains and tide-lines
  - Possible dangers: risks to media, acceleration of metal catalyzed deterioration, loss of sizing, loss of original chemical components, unpredictable changes in substrate structure
- Tear repair
  - Tear repair as a function of tear morphology
  - Remoistenable tissues
- Filling losses
  - Aesthetic concerns
- Resizing
  - Purpose of re-sizing and choice of re-sizing agents

- Lining
  - Possible benefits: a substitute for multiple individual repairs, overall strengthening
  - Possible dangers: deformation of the original paper, dimensional change of the original paper
- Removal of old repairs
  - Dry
  - Poultices such as methyl cellulose
  - Wet
  - Ethical considerations
- Coloring and retouching
  - Application of the colorant by brush
  - Application of the colorant by airbrush
  - Application of the colorant by means of a color bath
  - Retouching methods
  - Ethical considerations
- Flattening
  - Humidification methods – spraying, wetting, humidity chamber
- Scientific inquiry and controlled experimentation

#### Applied Theory:

- Students examine a variety of repair papers both western and Japanese and identify the characteristics these papers exhibit
- Different examples of repair types and losses in manuscripts are presented and the options for how they could be treated are discussed.
- Students undertake tear repair and infill practice with supervision using wet and dry techniques for tearing the paper (perforation, brush and water pen over a light source, or using a tracing on semi-transparent material over a light source or light-colored background)
- Students humidify and flatten the papers on which they have practiced in-filling and tear repair
- Students see how colors are matched
- Students see a paper resized and discuss the changes to be observed before and after treatment
- Each student sets up an experiment with controls to remove fills and old repairs with methyl cellulose

#### Assignments:

- Each student will be given a sample of paper and tone a repair paper to match it.
- Each student will create a loss in the given sample of paper and then use the toned repair paper to fill the loss. The final repaired paper will be submitted for a grade.
- Each pair of students performs two out of the four following experiments and writes a report giving their results and conclusions.
 

Experiment 1: Each team is to choose a repair paper and wet tear it into equal sized strips in one grain direction. The strips are adhered to A4 photocopy paper using 1% methyl cellulose, 3% methyl cellulose, wheat starch paste the consistency of milk, and wheat starch paste the consistency of yoghurt always applying the strips in the same direction on the photocopy paper.

After the strips are dried under weight, students record observations on strength of the adhesion of the repair, stiffness of the repair, any distortion of the photocopy paper.

- Experiment 2: Each team chooses a repair paper and a single type of adhesive at a given adhesive concentration. The repair paper is wet torn into equal sized strips in one grain direction. These strips are adhered to several other types of paper, applying the repair paper both in the direction of the grain and against the grain of the substrate paper. After the strips are dried under weight, students record observations on any differences between repairs applied on the grain and against the grain.
- Experiment 3: Each team designs and carries out an experiment to consider the effects of repairs in which the grain of the repair paper is parallel to that of the substrate paper and the grain of the repair paper is perpendicular to that of the substrate paper.
- Experiment 4: Each student makes two fills, in one of which methyl cellulose is applied to the fill paper, in the other it is applied to the edges of the substrate paper. Observations are recorded about the behavior and color of the fill.

#### Assessments:

- Each student through a written examination will describe different types of paper treatment and when and how these treatments are applied to Islamic manuscripts.
- Each student submits a sample of paper repaired with another paper that he/she has toned and receive a grade that reflects his/her level of manual skill, understanding of the task, attention to detail and seriousness of approach.
- Each student submits a written report for the experiments which receive a grade that reflects his/her achievement of the desired outcomes.

#### Outcomes: Students are able to

- Demonstrate their knowledge of different types of paper treatment and when and how these treatments are applied.
- Demonstrate the skill to tone paper and to repair losses and tears in paper.
- Demonstrate the ability to set up a controlled scientific experiment, to produce and record results and to derive logical conclusions from those results.
- Demonstrate an understanding of some of the effects that occur in paper-to-paper repairs using adhesives.

## MODULE 7 – Conservation Techniques and Materials 2

4 weeks total: 3 weeks with an instructor and 1 week working on assignments with long-distance supervision

### Key Concepts:

- Specific manuscript conservation issues: in sewing, in lining, in endband sewing, in board construction, in board attachment, in covering
  - Agents of deterioration
  - Manifestations of different kinds of deterioration
- Sewing
  - Different kinds of sewing
  - Different kinds of damage in sewing structures
- Lining
  - Different kinds of linings
  - Different kinds of board attachment as a function of the lining
  - Different kinds of damage in lining structures
- Endband sewing
  - Primary endband construction and its function
  - Secondary endband construction and its function
  - Different kinds of damage in endband structures
- Board construction
  - Different kinds of board composition
  - Different kinds of damage to boards
  - Different conservation methods in treating board damage
- Board attachment
  - Different kinds of board attachments
  - Different kinds of damage to board attachments
- Covering
  - Different kinds of coverings
  - Different kinds of damage to coverings

### Applied Theory

- Students sew using different sewing structures
- Students sew a model textblock
- Students apply a lining to a model textblock
- Students sew a mock-up endband
- Students sew an endband on their model textblock
- Students cut boards for their model textblock
- Students dye and pare leather pieces for their model partial leather binding
- Students attach boards to the model textblock and complete the covering of their partial leather binding

### Assignments

- Students split board, re-attach delaminated board, consolidate damaged board corners

- Students create additional sewing, endbands, linings, board attachments and covers as needed to demonstrate competence in performing the skills used in these activities

#### Assessment

- Each student submits a complete model manuscript with a partial leather binding and receives a grade that reflects his/her achievement of the desired outcomes
- Each student submits samples of split board, re-attached delaminated board and consolidated damaged board corners and receives a grade that reflects his/her achievement of the desired outcomes
- Each student submits additional models of sewing, endbands, linings, board attachments and covers as needed to demonstrate competence in performing the skills using these activities

#### Outcomes: Students are able to

- Make a model manuscript with a partial leather binding
  - The sewing in this model will have an appropriate structure and appropriate tension
  - The lining in this model is properly adhered and able to perform its function in board attachment
  - The primary endband structure is applied correctly and performs its function in the model manuscript
  - The secondary endband structure is applied correctly and with appropriate tension
  - The boards fit the model textblock
  - The board attachment is strong and correctly applied
  - The covering materials are prepared correctly
  - The covering materials are applied strongly and correctly
- Make samples of split board, re-attached delaminated board and consolidated damaged board corners
  - The split in the board is even and correctly placed
  - The re-laminated areas are strong and even
  - The consolidated corners are strong and stable and of appropriate shape
- Identify deficiencies in their work on the model manuscript and other samples and repeat them until they demonstrate the level of skill and attention that is sufficient

## Year 2 Program

The program is taught in 28 weeks total, 14 weeks with an instructor and 14 weeks working with long-distance supervision. It consists of the following five units.

Unit 1 (2 weeks with an instructor) – Each student has a case study manuscript with a focus on the textblock. This is not necessarily for treatment, but to practice all of the preparation work learned in the first year: documentation, research, needs for digitization, needs for exhibition, needs for storage, condition report, and treatment proposal.

Unit 2 (2 weeks with an instructor) – Each student has a case study manuscript with a focus on the binding. This is not necessarily for treatment, but to practice all of the preparation work learned in the first year: documentation, research, needs for digitization, needs for exhibition, needs for storage, condition report, and treatment proposal.

Unit 3 (4 weeks: 1 week with the instructor guiding the actual treatment work, 3 weeks working with long-distance supervision) – Each student has a treatment project of relatively small scope, i.e. with minor treatment needed for the textblock, binding or both. Students practice and carry out the full range of activities: documentation, research, needs for digitization, needs for exhibition, needs for storage, condition report, and treatment proposal, and then actually perform the treatment, make the necessary storage box or wrapper, and make the necessary exhibition support. At this time, the students set up a small project to install and monitor insect traps in some manuscript-holding institution. They also set up a monitoring program to measure environmental controls in some manuscript-holding institution. These monitoring programs will then be carried out for a minimum of 3 months.

Unit 4 (16 weeks: 8.5 weeks with the instructor guiding the actual treatment work, 7.5 weeks working with long-distance supervision) – Each student has a treatment project or projects of broad scope, i.e. one manuscript with extensive treatment needed for the textblock, binding or both, or more than one manuscript with diverse treatment needed for the textblocks and bindings. Students practice and carry out the full range of activities: documentation, research, needs for digitization, needs for exhibition, needs for storage, condition report, and treatment proposal, and then actually perform the treatment, make the necessary storage box or wrapper, and make the necessary exhibition support.

Unit 5 (4 weeks: 0.5 weeks with the instructor, 3.5 weeks working with long-distance supervision) – Each student as an exhibition/preservation project in partnership with a local manuscript-holding institution. The project might include collection survey, needs assessment, boxing for storage, training for staff, and/or preparing for an upcoming exhibition.

### Key concepts:

- Repetition of all the key concepts from the first year
- Practice of all the key concepts from the first year
- Extending knowledge and use of conservation techniques and materials
- Extending knowledge and use of testing methods and research skills
- Practice advisory skills in working with manuscript-holding institutions

- Placing a particular treatment within the needs of the overall collection and making a decision about the most effective use of a conservator's time, knowledge and skills within budgetary constraints in order to produce the greatest value for the conservation and preservation of that collection

Applied theory and assignments:

- Carrying out the projects outlined above

Assessment:

- Each student submits reports and documentation which demonstrate the completion of the projects outlined above and show the use of conservation skills, knowledge, techniques and methods at a standard accepted as satisfactory by professional codes of ethics. Each report receives a grade that reflects the student's achievement of the desired outcomes.

Desired outcomes: Students are able to

- Perform the duties of a conservator before, during and after treatment at a standard commensurate with professional codes of ethics
- Perform the duties of a conservator using a variety of techniques, approaches, methods and materials in carrying out practical treatments
- Perform the duties of a conservator in preparing manuscripts for storage and exhibition
- Perform the duties of a conservator in preparing manuscripts for digitization
- Perform the duties of a conservator in identifying institutional conservation/preservation needs and formulating recommendations for their improvement

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<http://www.eesc.europa.eu/resources/docs/053-private-act.pdf>

[https://icon.org.uk/system/files/documents/icon\\_code\\_of\\_conduct.pdf](https://icon.org.uk/system/files/documents/icon_code_of_conduct.pdf)

[https://www.nps.gov/training/tel/Guides/HPS1022\\_AIC\\_Code\\_of\\_Ethics.pdf](https://www.nps.gov/training/tel/Guides/HPS1022_AIC_Code_of_Ethics.pdf)

<http://www.conservation-us.org/about-us/core-documents/code-of-ethics-and-guidelines-for-practice#.Vz8Gok3Vy70>

## Budget for Equipment and Supplies

Explanatory note: This budget was designed and intended for the International Islamic University of Malaysia (or some similar educational institution) to establish a new, basically equipped Islamic manuscript conservation laboratory for a class with a maximum of 12 students. Any expenses attached to the space for the laboratory within the university were not included, nor was the salary or any other costs for the person or persons who will order, purchase and track delivery of the items in the budget. Otherwise necessary items are noted. If an item is probably available locally in Malaysia, this is indicated in the "Source" column, and the figure in the budget for this item is an estimate. If an item may need to be ordered from a foreign source, a company that stocks this item is noted in the "Source" column, with the actual price of the item as listed in the company's catalog in January 2014. It is probable that some of these items (or appropriate substitutes) may also be available locally at a greatly reduced cost. By the same token, some necessary items may have been inadvertently left out of the budget. To cover these unforeseen expenses, a contingency fund of 5% of the total has been added. So the budget, as given, represents the most expensive scenario for establishing a manuscript conservation laboratory, and the actual costs could be significantly less. It should be pointed out that the purchase of furniture and equipment and tools is mostly a one-time expense. Subsequent expenditures to maintain the laboratory involve only the replacement of consumables, as needed.

If the curriculum is taught at a manuscript-holding institution in modules that are spaced out over time, the budgetary costs will depend on the supplies and equipment already at the institution. For those items that still need to be purchased, they can be acquired when needed for a particular module; they do not, necessarily, have to be purchased in total before any instruction begins.

As prices quoted were those available in January 2014, inflationary increases can be expected with the passage of time, and the longer the time that elapses, the greater the variance from current costs. Nonetheless, this still provides a kind of rough estimate for planning purposes.

ITEM	Price Per unit (USD)	Amount	Total Price (USD)	Source
<b>EXAMINATION</b>				
Tripod	30	1	30	Talas
Cloth background for photography	35	1	35	Talas
Optivisor	35.65	5	178.25	Talas
Dust masks	3.57	3 packs	10.71	Talas
	(pack of 5)			
Micrometer	343	1	343	Talas
Cotton gloves	3.00	5	12	Talas
	Each			
Latex gloves	10.95	3	32.85	Talas
	pounds – pack of 100	(small, medium & large)		
Spectroline minimax UV - UV4AW (talas - UV + white light)	60.70	1	60.70	Talas
UV glasses	20.40	6	122.40	Talas
Color scale - X-Rite M5000 ColorChecker Classic	69	1	69	Amazon
Slim light	206.25	1	206.25	<a href="http://thinlighteurope.com">http://thinlighteurope.com</a>
<b>SUBTOTAL</b>			<b>\$1100.16</b>	

#### ADHESIVES

Kluceel G – 1lb	46.60	2	93.20	Talas
Fish glue (Isinglass) – 1 oz	48.10	1	48.10	Talas
A4M Methyl Cellulose 3000 Cellulose 1 lb	11.25	2	22.50	Talas

Gelatine (photographic grade) – 1 lb	24.15	1	48.30	Talas
Aytex-P Wheat Starch Paste – 1 lb	5.60	4	22.40	Talas
Evacon – 10 Kg	128	1	128	Conservation by Design

**SUBTOTAL** **\$362.50**

**SUPPLIES FOR ACTIVE CONSERVATION**

Foam eraser - pack of 10	15	1 pack	15	PEL
Smoke / chemical sponge	3.20	5	16	PEL
Acetate sheets or roll			40	Local
Normal eraser	5 per pack	1 pack of 10	5	Local
Holytex – thin (0.0029”) – per 100 yard roll	281.70	1	281.70	Talas
Holytex – thick (0.0053”) – per 100 yard roll	483.55	1	483.55	Talas
Blotting paper – thin (30pt/18 micron) – 32” x 40” - 100 sheet	4.80 per sheet	100	480	Talas
Blotting paper – thick (100pt/12 microns) – 38”x 52” – 100 sheets	18.65 per sheet	100	1865	Talas
Japanese papers (various weights)			3000	Talas
Board - Heritage Corrugated (box making and binding covers) 20" x 24" - Pack of 10	37.50	1 pack	37.50	Talas
Board – box making practice			100	Local
Board (museum-quality, acid-free, 4-ply) – 40” x 60” – 20	26.90 per sheet	10	269	Talas
European papers (various weights)			800	Talas
Leather (vegetable tanned) - 8-11 sq feet per hide	30	10	300	Talas
Cellulose powder 1kg	35	1	35	Talas
Leather dyes – set of 10	143.25	1 set	143.25	Talas
Sewing thread (linen, thin and thick)	12.40 each	4	49.60	Talas

Sewing thread (cotton, various colors)	3 each	10	30		Local
Fabric (Book Cloth) 40" x 1yard 100% linen	44.10	20	882	Talas	
Paints (watercolor)	45 per set	1	45	Talas	
Paints (acrylic) – various colors			300		Local
Pastel chalks	25 per set	1	25	Talas	
Paint palette	3 per piece	4	12	Talas	
Watercolor pencils	20 per set	1	20	Talas	
Marking pens and pencils	1	20	20		Local
pH indicator papers	17.95 per box	1	17.95	Talas	
Tyvek 60" x 10 yard	65.85	1	65.85	Talas	
<b>SUBTOTAL</b>			<b>\$9338.40</b>		

#### HANDTOOLS AND SUPPLIES

Teflon folder	21.50 each	6	129	Talas	
Bone folder	5.35 each	6	32.10	Talas	
Brushes (Japanese, glue, paint, various sizes and types)			750	Talas	
Beakers 5 piece set	18	1	18	E-bay	
Measuring cylinder (glass) 250 ml	18	2	36	E-bay	
Air-mist bottle	6.95	2	13.90	Talas	
Scalpel	3.90 each	12	46.8	Talas	
Scalpel blades (box of 100)	24.50	3 box (dif. size)	73.50	Talas	
Dental tool	18.95	6	111.70	Talas	
Drycleaning brushes	20	4	80	Talas	
Tweezer	13.25	20	265	Talas	

Small scissors	10	12	120	Talas	
Paper scissors	10	5	100	Talas	
Water pen	5.75	3	17.25	Talas	
Spatula (various sizes and characteristics)	20	10	200	Talas	
Wrapping bandages	5	3	15		Local
Plexiglass pieces (different sizes)		40	200		Local
Clamps (various sizes)		15	50		Local
Rulers (various sizes and weights)		7	250	Talas	
Metal triangle	30.50	1	30.50	Talas	
Caliper	10.95	1	10.95	Talas	
Awl	4.49	3	13.47	Talas	
Needles (various shapes and sizes)			15		Local
Cotton cloth	10 per yard	2	20		Local
Bamboo skewers – 1 set	4	1 set	4	Talas	
Wool Felt (1/8" x 72" x yard)	84 per yard	4	336	Talas	
Cutting Mat 36" x 48"	202.50	2	405	Talas	
Leather paring knife	16.25	2	32.50	Talas	
Leather spoke shave	39.95	2	79.90	Talas	
Laminated wooden boards	10	8	80		Local
Iron weights (various sizes)		20	80		Local
Glass bottles (various sizes)		10	15		Local
Plastic containers (various sizes)		10	40		Local
Teflon-coated cooking pot (small) - Amazon	10	1	10		Local
Wooden spoon	5	1	5		Local
Glass plate	15	1	15		Local
Extension cords	8	5	40		Local
Normal A4 paper			100		Local

Kraft paper			30	Local
File folders		100	25	Local
Cotton	2	1	2	Local Pharmacy
<b>Subtotal</b>			<b>\$3897.57</b>	

#### FURNITURE AND HEACY EQUIPMENT

Book clamp (Finishing Press) – one 21" and one 28"	235 + 295	1	530	Talas
Roll storage	226.95	1	226.95	( <a href="http://www.thelibrarystore.com/product/ad46-1002/storage_and_paper_racks">http://www.thelibrarystore.com/product/ad46-1002/storage_and_paper_racks</a> )
Paper flat storage drawers	1599.99	1	1599.99	( <a href="http://www.utrechtart.com/Flat-Files-Studio.utrecht">http://www.utrechtart.com/Flat-Files-Studio.utrecht</a> )
Board cutter 29", 29" X 20", 51 lbs.	865.40	1	865.40	Talas
Book press	695	1	695	Local
Tables	2500	Full set	2500	Local
Chairs	1500	Full set	1500	Local
Table lamps	300	Full Set	300	Local
File Cabinet	200	1	200	Local
<b>Subtotal</b>			<b>\$8417.34</b>	

#### CHEMICALS

Ethyl alcohol – Gallon	60	1	60	Local
Acetone – quart	25	1	25	Local
Magnesium hydroxide - 1lb	10	1	10	Local
Calcium Carbonate – 1lb – ultra fine	10	1	10	Local
<b>SUBTOTAL</b>			<b>\$105.00</b>	

