Environmental Health and Safety Manual
for Art and Design Disciplines

Department of Art and Music

Approved and Adopted on December 10, 2013
**Introduction**

Each member of the Department of Art and Music, whether faculty, staff, or student, is responsible for knowing and observing the University Environmental Health and Safety and the Art and Design Environmental Health and Safety Policies. The goal is to develop positive attitudes regarding health and safety among all faculty, staff, and students within the Studio Art program. It is essential that all members take an active part to initiate and enforce preventive measures to control hazards associated with activities under their direction.

This manual has been prepared to give the working artist an overview of the hazards connected with the materials he/she is using, and suggestions on how to use them safely. In addition to identifying these materials, guidelines on the use of studio equipment have also been included.

In many cases it may not be known whether a particular material will cause health problems to an artist, so all chemicals and materials should be handled with caution. It is well documented however, that you will place yourself at a much higher level of risk by practicing your art without following studio rules that have been developed to minimize your actual exposure to toxic materials. The faculty are experts in their respective areas and strive to stay abreast of changes and new materials and techniques in their discipline.

Chemicals can enter the body through direct contact with your skin, ingestion, and through inhalation. Skin contact and inhalation are the most common methods of entry. The human body has defensive barriers; but many art products contain acids, caustic alkalies, peroxides, bleaches and organic solvents which may cause deterioration of these body defenses. Constant exposure can cause both severe short and long term damage.

The breakdown of these defenses may occur suddenly and immediately or slowly over an extended period of time. Disruptions to the digestive system can occur when your hands, contaminated with various art materials, come in contact with your mouth. This often occurs when food and/or drinks are exposed to these chemicals in the studio. While most people have the common sense not to drink toxic substances directly, people have been known to accidentally consume chemical substances which have been placed in common eating or drinking utensils. Do not put solvents such as Odorless Mineral Spirits (OMS) in a coffee cup or glass. Inhaling materials can also contribute significantly to the disruption of your digestive system. Once inhaled, materials travel through your stomach and finally find their way into your bloodstream.

Finally, be considerate when using solvents and sprays or any other toxic substances. Use toxic solvents only at appropriate exhaust ventilation stations or outside. (This includes spray fixative). Leftover solvents must be disposed of in the proper Hazardous Waste containers found in the Painting, Printmaking and Ceramics Studios.

This manual, policies and guidelines have been developed by the faculty in consultation with Maureen Bagge-Fowler, FSU EHS Coordinator, health and safety protocols at peer-institutions, EHS Office at Massachusetts College of Art and Design, and the Professional Practices for Artists standards and guidelines developed and approved by the College Art Association, which were last updated in 2011.
Purpose
The purpose of this manual and the policies contained herein are to set forth general guidelines for the Studio Art areas. Individual studio safety procedures are essential in providing a safe and healthful performance of art activities and the safest possible working and educational environment for faculty and students. The Art and Design Safety Procedures will follow the provisions of the FSU EHS Program and any other applicable local, state, and/or federal regulations.

The Art and Design Safety Procedures have been developed to allow you, the artist, to practice your art in an environment that allows working with toxic materials in a safe manner and in a controlled environment. Material Safety Data Sheets (MSDS) can be found on both the fourth floor and ground floor or May Hall, in designated Right to Know Compliance Centers in the labeled yellow binders. If you have a question relative to materials you are using or would like to use, please read the information contained in these sheets. Remember, you may be working with a material that has the potential to be highly toxic if used improperly or if used without taking necessary precautions by equipping yourself with respirators, goggles, gloves, etc. The most important thing to do is ask if you have a question, the faculty are here to help you and ensure all students are working in the safest environment possible.

Goal of EHS Policies and Procedures
It is the goal of the Department of Art and Music to create a safe working environment through the development of:

- Safety Instruction
- General and Area Specific Written Procedures
- Supervision
- Training in the Use of Materials and Equipment

Awareness Education and Dissemination of Safety Information
The overall responsibility for safety and health rests with the area supervisor and/or instructor. Faculty members are responsible for safety and overseeing housekeeping in their teaching areas. Where two faculty members share a facility, the supervisor shall designate areas of responsibility. Each faculty member is responsible for developing, posting, and enforcing any special safety precautions particular to his/her area arising from the nature of instruction. Each student is responsible for knowing all school and area-specific safety policies. Students will be trained on the proper use of materials and equipment in each course by the instructor prior to being given access to tools, materials or after-hours studio access.

Responsibilities of Faculty, Staff and Students
There are dozens of Environmental Health and Safety (EHS) regulations and codes at the federal, state, and local levels. It is essential that the University understand not only which regulations and codes apply to Framingham State University activities but also what these regulations specifically require. The EHS Officer in the Office of Facilities and Capital Planning will maintain a comprehensive listing of applicable regulations and codes that includes a summary of the regulations, and relevant regulatory citation.

Changing activities and operations at the University over time will change how regulations and codes apply. Likewise, as new EHS laws and local ordinances are adopted and new regulations are promulgated, regulatory applicability and impact on the University will change. The EHS Office serves as a resource to track regulatory developments by subscribing to EHS newsletters and regulatory bulletins, attending EHS conferences and seminars, monitoring
agency web sites, and participating in agency advisory committees. The EHS Office will also coordinate programs to train University employees on regulatory requirements.

Each faculty member is responsible for the dissemination of information to students and employees under their active academic jurisdiction. These responsibilities include, but are not limited to, the following:

• Explain to students the University and Departmental safety regulations/procedures pertinent to their specific academic tasks and/or activities.
• Assure the safe and appropriate use and storage of materials in the lab/studio areas.
• Require students to use personal protective devices and clothing as needed for the proposed instruction or activity. Such devices and equipment must be maintained in good repair.
• Inspect instructional areas frequently for identification and prompt elimination of unsafe practices and conditions. Advice and assistance is available from Environmental Health and Safety on campus, and from the EHS Coordinator Maureen Bagge-Fowler in the Office of Facilities and Capital Planning.
• Seek prompt medical treatment for any student injured by calling University Police at (508) 626-4911, or by dialing extension 4911 from any campus phone. The red phones in each studio area will dial the police immediately.
• Notify the Department Chair of all accidents involving students, faculty, or staff, even those that do not require medical attention. This information is used statistically to plan future safety policies.
• Submit recommendations for the improvement of the immediate academic environment to the Department Chair.
• Assure compliance with the Hazardous Substances Disclosure by Employers Act (HSDEA), Massachusetts General Laws (MGL), Chapter 111F, Sections 7 to 11, and MGL Chapter 111F, Sections 13 to 15, and regulations at 454 Code of Massachusetts Regulations CMR) 21.01 to 21.09. Massachusetts has its own worker right-to-know law (HSDEA) that applies to public sector workplaces. This law is not federally approved; therefore, it is preempted by federal Occupational Safety and Health Administration (OSHA) in the private sector workplace and applies to the public sector (state, county, and municipal government offices and operations, except armories and police stations where ammunition is stored) workplace only.
• Labeling hazardous chemicals or products

University employees, student employees and students are subject to all campus EHS regulations. Compliance is vital to the creation and maintenance of a healthy and safe studio environment. These responsibilities include, but are not limited to, the following:

• Understand and comply with the University and Department safety protocols, whether written or oral, when performing assigned work duties.
• Use only tools and equipment approved or provided by the supervisor/instructor.
• Use appropriate safety equipment and guards, and work with established safety procedures.
• Report unsafe conditions, practices or equipment to the instructor, supervisor or Department Chair whenever such deficiencies are observed and as often as necessary to assure correction.
• Inform the instructor/supervisor and safety supervisor immediately of all injuries or accidents and assist injured persons in obtaining prompt medical treatment when necessary.
Each individual who requires a respirator should complete a medical evaluation (either through Health Services or their personal physician) and fitting for the appropriate type of filtration, etc. This includes being properly trained and fit-tested to wear the respirator. The use of respirators is voluntary, and individuals with certain medical conditions should be extra vigilant.
Section I. Hazardous Material Storage and Disposal

All Health and Safety Policies and Waste Disposal is handled by Environmental Health and Safety (EHS) managed through the Office of Facilities and Capital Planning. These are all posted and updated regularly on the following URL: http://www.framingham.edu/facilities/environmental-health-and-safety/index.html

The mission of EHS is to provide assistance, oversight, and technical consultation to the University community on all occupational and general health, environmental and safety issues with the goal of ensuring a safe and healthful environment for employees, students and the visiting public.

The Massachusetts Right to Know Law and other regulations address employee and community concerns about hazardous materials in the workplace and the potential adverse health effects from exposure to these substances. The Massachusetts Right to Know Law established requirements designed to help public employees by preventing adverse health effects from exposure to workplace chemicals. All employees have a need and a right to know what chemicals they may have contact with in their workplace. Framingham State University provides annual training to employees who may come in contact with hazardous materials and maintains a library of material safety data sheets (MSDS) on products used on campus.

Hazardous waste is regulated under the Code of Massachusetts Regulations, 310 CMR 30.00. Hazardous wastes are identified, collected, labeled, properly handled and placed in hazardous waste satellite and accumulation areas throughout the University buildings.

Satellite accumulation areas are found wherever hazardous wastes are created. These are: the Painting, Printmaking and Ceramics Studios in May Hall, Hemenway Hall science laboratories, Power Plant, Whittemore Library dark room and print shop.

Storage of all corrosive, flammable and volatile chemicals used in the Studio Art program must be in the designated storage cabinets in the Ceramics, Painting, Printmaking and Sculpture studios.

Effective immediately, no student at Framingham State University may bring any hazardous material on campus that is not directly related to the academic or social function of the University. The faculty reserve the right to prohibit storage or use on the premises of any material that, in the opinion of the Department and University, is too hazardous to be present regardless of its intended use.

The owner or possessor of unsuitable materials will be asked to promptly remove them from the premises. If the owner cannot, will not, or should not (because of high risk) remove the material themselves from the campus it will be sequestered by either the EHS Coordinator for subsequent removal and disposal at the expense of the material's owner, if applicable. If the material is an illegal narcotic or an explosive or pyrotechnic device of any type, it will be confiscated by the University Police and its owner or possessor may be subject to appropriate discipline.

• Students are not allowed to store any potentially hazardous material (solid, liquid or gas) in any personal locker, cabinet, desk, taboret, or crevice not specifically designed for chemical storage except under the following conditions:
• The material is directly related to work being done in a class, for example oil paints, printing inks, etc.
• The student obtains a copy of a Material Safety Data Sheet (MSDS) or other appropriate literature (i.e. photocopy of the printed label) that describes the hazards of the material.
• The instructor of record of the course for which the material is to be used must give permission for storage after reviewing the safety material provided by the student.
• The hazardous material is always stored in an unbreakable container (i.e. metal or heavy plastic) that is closed with a cap or lid that will prevent leakage when the container is tipped over. Where possible, the storage container shall be the one in which the hazardous material was originally obtained.

Specifically prohibited are the following types of containers:
• Glass jars or bottles, excluding Silicoil jars or those properly labeled and stored in the yellow flammables cabinet in the Painting Studio (412 May Hall)
• Uncapped or open containers of any sort.
• Coffee cans, beakers, jars, etc. with loose or improvised lids (i.e. corks, wax paper or plastic wrap, etc.).
• Food containers (such as Tupperware, soft drink bottles, etc.) that are not clearly labeled as containing hazardous materials.
• Damaged containers of any sort or already leaking containers.
• No container for a flammable liquid (e.g. turpentine, dakar varnish, mineral spirits, etc.) may not be larger than one-gallon.
• On-site storage of any student owned material (hazardous or otherwise) is at the sole discretion of the Department and University. Materials whose ownership is not obvious; or that are not related to academic work; or whose containers are unlabeled, damaged, leaking or otherwise faulty; or which represent any other unacceptable risk to life or property; or that may be reasonably considered unwanted or abandoned are subject to being removed from the premises without either prior notice or compensation to the owner.

Section II. Rules For Labeling Containers of Solvents, Painting Medium and other Hazardous Materials

It is illegal and dangerous to mislabel any kind of hazardous material regardless of whether it is new, used or waste. Any hospital emergency ward doctor can tell you of people who have been poisoned or disfigured by solvents and cleaning materials stored in common eating and drinking vessels. All unmarked or recycled containers containing hazardous materials (new, used or waste) on campus, must be labeled with a reasonable description of their contents (i.e. “mineral spirits”, “three-part medium”, etc.) and the hazard (i.e. “toxic”, “flammable”, and/or “caustic”). A simple self-adhesive label, or even tape, written on with a sharpie, is all that is necessary.
Section III. Safety Protocols by Discipline/Material
The following section details the Safety Procedures specific to each individual discipline currently taught at Framingham State. Due to the changing nature of artist materials and the constant development of new products, consult with the faculty in each area about materials and techniques not outlined below.

Section III.A. Ceramics
Clay is most dangerous when it is in a dry state and the dust can be inhaled. Silica is an ingredient found in a wide variety of materials used by artists and craftspeople, including sand, quartz, foundry molding sand (silica flour), sandstone, calcined diatomaceous earth, granite, flint, many abrasives, slate, clays, fused silica, feldspar and many carving stones. Amorphous or noncrystalline silica includes such materials as diatomaceous earth and cabosil.

Inhalation of large quantities of silica during the mixing of powdered clay is very hazardous and can cause silicosis or "potters rot" after years of exposure. Silicosis takes at least 10 years to develop and entails symptoms such as shortness of breath, dry cough, emphysema, and high susceptibility to lung infections such as tuberculosis. Skin contact and ingestion pose no significant hazards.

During kiln firing, toxic fumes and gases are produced. These can include carbon monoxide, sulfur dioxide and chlorine released from the clay or glazes. All gas should be in well ventilated areas. Avoid procedures that produce dust. Keep materials wet. Work with pre-mixed clay (when possible). Clean up wet glaze spills before they dry. Wet mop or wet vacuum instead of sweeping. Sweeping generates particles of dust that will remain airborne and hazardous for as much as six hours after the sweeping has ended.

Protect your face and eyes. Use respirators and goggles during mixing, chipping and grinding. Always ensure that the space you are working in is well ventilated. Learn about the chemistry of the materials with which you are working by reading labels, charts and the MSDSs (Material Safety Data Sheets) before, not after, you use the material in your art.

Handling Wet Clay
Molds that grow in wet clay may cause respiratory problems similar to pneumonia and asthma-type allergies. Respiratory problems can also result from inhalation of powders that develop when aged clay dries. The molds, which can contribute to the workability of the clay, can cause skin problems, particularly if there is a pre-existing dermatitis.

Handling cold wet clay, such as when throwing clay, can cause abrasion and drying of the hands, particularly the fingertips. This is a result of the mechanical friction or rubbing of the clay particles on the hands, the oil absorbing ability of the clay, and the harmful effects from prolonged exposure to cold water.

Mechanical/Physical Safety Hazards
The use of a kick-wheel for throwing clay is a mechanical hazard since the moving parts can cause cuts and abrasions. Small pieces of wet clay that collect on the floor and bench can dry and becomes pulverized, producing an inhalation hazard due to the presence of free silica. This also applies to the process of reconditioning clay or grog.

Glazes also pose health and safety concerns, due to the presence of toxic heavy metals, such as cobalt, hexavalent chromium, nickel, titanium and vanadium. These powdered glazes are respiratory hazards, in addition to being carcinogenic and teratogenic.
Section III.B. Drawing

Drawing materials are pigments (raw color) suspended in a vehicle (carrier) such as wax, inert minerals (pastels, conté, crayons, chalks), and liquids (solvent based inks and marking pens). Pencils contain "leads" made of graphite and clay or pigmented clay/binder mixtures (colored pencils). Drawing inks may contain hazardous dyes and solvents. Skin contact should be avoided.

Dry pastels release respirable-sized pigment and other vehicle particles. Oil pastels contain small amounts of oils and waxes which keep dust particles from becoming airborne and therefore can be used more safely.

The hazards of drawing arise due to exposure to the pigments, vehicles or solvents. The most common exposure to these chemicals is through inhalation by working with raw powdered pigments such as dusty chalks or pastels, by inhaling the dust that accumulates and circulates from drawing materials in the drawing room.

Charcoal has no significant hazards, but excessive inhalation can cause respiratory agitation, and may be problematic for individuals with allergies and/or asthma. Charcoal is considered a nuisance dust. Inhalation of large amounts of charcoal dust can create chronic lung problems through a mechanical irritation and clogging effect. A major source of charcoal inhalation is from the habit of blowing excess charcoal dust off the drawing. Colored chalks are also considered nuisance dusts. Some chalks are dustier than others. Individuals who have asthma sometimes have problems with dusty chalks. Pastel sticks and pencils consist of pigments bound into solid form by a resin. Inhalation of pastel dusts is the major hazard.

Blowing excess pastel dust off the drawing is one major source of inhalation of pastel pigments. Some pastels are dustier than others. Pastels may contain toxic pigments such as chrome yellow (lead chromate), which can cause lung cancer, and cadmium pigments which can cause kidney and lung damage and are suspect human carcinogens. Both permanent and workable spray fixatives used to fix drawings contain toxic solvents. There is high exposure through inhalation to these solvents because the products are sprayed in the air.

In order to prevent and minimize your inhalation of dusts when using dry-media:
• Use the least dusty types of pastels, chalks, and pencils.
• Do not work near a draught or fan that will blow them about. Do not blow-off excess charcoal or pastel dust with your mouth. Alternately, tap-off accumulated dust so that it falls to the floor.
• Do not eat or drink when working with drawing materials.
• Wear dedicated work clothing and launder frequently.
• Keep your work areas clean by wet-mopping to avoid disturbing settled dust.
• Protect hands and skin by wearing gloves, especially if you have cuts or abrasions. Or use a barrier cream. Barrier creams should be applied about 30 minutes before starting work. Do not allow your hands to get caked in materials - wash your hands frequently and re-apply barrier cream when necessary. Keep your hands away from your face and eyes.

Aerosol sprays are very popular with artists. They are used for a variety of purposes: retouching, fixatives, adhesive sprays, painting, etc. Fine mists containing possible toxic materials can travel long distances or be suspended for extended periods before settling. In addition to the dangers that may exist from the active ingredients, propellants are commonly
flammable or toxic as well. The hazards of the propellant are not always prominently indicated on the can’s label.

Spray fixative should be used outside, or inside using with spray booths designated for such purposes. When applying spray fixatives outdoors you should wear a NIOSH-approved respirator equipped with organic vapor cartridges and dust/mists filter for protection against inhalation of solvent vapors and particulates. Be sure to direct spray away from anyone’s breathing space. Store unused, or partially used, spray cans away from fire (or other ignition sources) and at a temperature that does not exceed 120°F. Empty cans should be disposed of in the trash promptly, as these containers can rupture if punctured or excessively heated. Use non-aerosol products if available.
Section III.C. Painting
Painting and drawing materials consist of pigments mixed with various vehicles such as water, oil, wax, egg yolk, casein, resins and solvent solutions. The primary hazard in standard painting techniques is the accidental ingestion of pigments due to eating, drinking or smoking while working with paints. Ingestion may occur through inadvertent hand-to-mouth contact or by pointing the tip of the brush with the lips.

When choosing a medium to use, most painters do not give sufficient consideration to the hazards connected with the use of different pigments. Do not just assume that aqueous media (i.e., acrylic, gouache, or watercolor) is completely safe, there is no such thing. Even ready-to-use lead-based paints are dangerous to handle and precautions need to be taken. Carefully washing your hands after using these materials is crucial to ensuring that hazardous materials connected with them are not inhaled or accidentally ingested. Use the smallest amount possible of any solvent. Do not use solvents to clean your hands - wear barrier cream or gloves when working and follow this with soap and water. Use solvent resistant gloves (blue nitrile) whenever possible.

Methods such as spraying, heating or sanding may cause a potential for inhalation of toxic pigments. Lead and other toxic metal-containing pigments are common in painting and drawing products. Lead pigments can cause anemia, gastrointestinal problems, peripheral nerve damage and brain damage in children, and kidney damage or reproductive system damage. Other inorganic pigments may be hazardous including pigments based on cobalt, cadmium and manganese. Some of the inorganic pigments, in particular cadmium pigments, chrome yellow and zinc yellow are known or suspect human carcinogens and may cause lung cancer. Chromate-containing pigments such as chrome yellow or zinc yellow and cobalt can cause skin irritation.

Always wear gloves when handling varnishes, lacquers, thinners and other solvents and make sure that there is ample ventilation by turning on the overhead system. The controls are next to the south entrance to the studio. Since most solvents are flammable be sure that you are familiar with the location of the studio fire extinguisher(s). When disposing of rags or used liquids please use the containers marked for this purpose. Storing oily rags improperly in the studio not only creates a health risk to you, but it could contribute significantly to causing spontaneous combustion and result in a fire.

The following safety precautions shall be followed when working with all types of paint:

- Obtain a material safety data sheet (MSDS) on your paints to find out what pigments you are using. This is especially important because the name that appears on the tube of color may or may not truly represent the pigments present. Manufacturers may keep the name of a color while reformulating the ingredients. Do not use lead-containing or carcinogenic pigments. Use the least toxic pigments possible.
- Eating and drinking is prohibited in the Painting Studio.
- Avoid using dishes, containers or utensils from the kitchen to mix or store paints and pigments.
- Adhere to all posted Studio Maintenance, Clean-up Procedures and Chemical Storage.

Water-Based Paints
Water-based paints include watercolor, acrylic, gouache, tempera and casein. Water is used for thinning and clean-up.
Acrylic paints contain a small amount of ammonia. Some sensitive people may experience eye, nose and throat irritation from the ammonia. Acrylics and some gouaches contain a very small amount of formaldehyde as a preservative. People already sensitized to formaldehyde may experience allergic reactions from the trace amount of formaldehyde found in acrylics. Casein paints use the protein casein as a binder. While soluble forms are available, casein can be dissolved in ammonium hydroxide which is moderately irritating through skin contact and highly irritating through eye contact, ingestion and inhalation.

Non-Water Based Paints
Oil paints, encaustic and egg tempera use linseed oil, wax and egg respectively as vehicles, although solvents are often used as a thinner and for clean-up. Turpentine and mineral spirits (paint thinner) are used in oil painting mediums, for thinning or for cleaning brushes. Alkyd paints use solvents as their vehicle. In addition, many commercial paints used by artists also contain solvents. The only solvent permissible for use in the studio is Gamsol OMS, which is provided by the Department

Solvents can cause defatting of the skin and dermatitis from prolonged or repeated exposure. Acute inhalation of high concentrations of mineral spirits, turpentine vapors, and other solvents can cause narcosis, which can include symptoms of dizziness, headaches drowsiness, nausea, fatigue, loss of coordination, coma and respiratory irritation. Chronic inhalation of large amounts of solvents could result in decreased coordination, behavioral changes and brain damage. Chronic inhalation of turpentine can cause kidney damage and respiratory irritation or allergies. Ingestion of either turpentine or mineral spirits can be fatal. In the case of mineral spirits, this is usually due to chemical pneumonia caused by aspiration (breathing in) of the mineral spirits into the lungs after vomiting. Turpentine can also cause skin allergies and be absorbed through the skin.
Section III.D. Printmaking

Printmaking methods use a variety of solvents and solvent mixtures, primarily for cleaning. Aromatic hydrocarbons and other lacquer solvents are hazardous and must be used with adequate ventilation. Benzyl must be avoided. Inks used in printmaking (black and white) usually contain carbon black. Studies have shown that repeated contact with carbon black can cause skin cancer years later. Protect your skin from absorbing these chemicals. Common toxic pigments used in printmaking include chrome yellow (lead chromate), zinc yellow (zinc chromate), milori green (lead chromate), and cadmium colors.

Since most solvents used in printmaking are skin irritants, skin contact with them should be avoided as much as possible through the use of gloves, especially during cleanups. Rags impregnated with ink or solvents may represent both a health and fire hazard. Be sure they are discarded into the special fire proof containers provided for this purpose.

One of the greatest hazards in intaglio printing is in etching the printing plates, particularly with acids. Acids can cause severe skin burns. Eye damage from splashed acid can also be dangerous. Treatment for exposure to acid is to flush clear water on the affected eyes, skin or clothing for a minimum of 15 minutes, followed immediately with medical attention by a doctor or nurse. There is an eyewash station next to the side door of the studio, and a eyewash bottle next to the sink adjacent to the acid baths. Eyewash stations are marked to show the last date of inspection, if the solution is expired tell the instructor so that it can be replaced.

Nitric acid etching releases the respiratory irritant nitrogen dioxide, which has poor odor warning properties. Large acute overexposures may cause pulmonary edema (chemical pneumonia) and chronic exposure may cause emphysema. During the etching process, flammable hydrogen gas is also produced. Concentrated nitric acid is a strong oxidizing agent and can react with many other chemicals, especially solvents or other organic compounds, to cause a fire.

When diluting acids, add acid to the water, not the reverse. Pouring water into concentrated acid causes a violent reaction including spattering, splashing and sudden build-up of heat. Trays in the acid hoods must be kept covered to prevent unneeded exposure to fumes and reduce evaporation.

Lithography also includes possible exposure to solvents, such as; mineral spirits, small amounts of lacquer thinner, and alcohol. Also, small amounts of acids, such as; nitric acid, tannic acid, hydrochloric acid, glacial acetic acid and phosphoric acid are used on occasion. Although these materials are used in relatively small amounts they are potentially dangerous if used incorrectly. Hazards in lithography include the handling of concentrated acid. Great care should be taken with this or with any other concentrated acid. Respirators, goggles, face shield, aprons, and gloves should always be worn.

In regards to woodcut, students should be vigilant to only use tools specifically designed for wood-carving. Caution must be exercised when carving the woodblock. Always use a bench hook and cut away from your hands and body. In case of an accident First-Aid Kits are available next to both sinks and in the Painting Studio.

Extra caution must also be used in the operation of print equipment. Intaglio printing requires a great deal of pressure and it is necessary to operate the presses properly. Students must be alert and knowledgeable when operating print equipment and seek assistance when in doubt.
Section III.E. Sculpture/3D Design

Hand tools are a fundamental aspect of working in the Sculpture Studio; however, hand tools are the most common cause of personal injury. Causes of hand tool injuries can often be traced to some type of improper use or maintenance of the hand tool. The information below focuses on non-powered hand tool safety, and ways to avoid injury.

- Use the right tool for the job. Some examples of misuse of tools are using a wrench as a hammer, pliers as a wrench, knife as a saw, claw hammer as a ball-peen hammer, screwdriver as a chisel, etc.
- Ensure you have the correct size tool, such as correct screwdriver, pliers, scissors, etc.
- Individuals using the tool should be trained in the basic safety and proper use of the tool.
- Keep tools in good condition. Broken or worn tools (i.e. wrenches with cracked or worn jaw, electric tools with broken plugs, etc.) should be repaired or discarded immediately. Report defective equipment to your supervisor.
- Use tools the way they were intended (i.e. drive a wood chisel outward and away from your body).
- When using a knife, cut away from the body and keep hands and body clear of knife stroke.
- Razor blades and utility knife blades should be disposed of in a puncture-resistant sharps container.
- Be cautious of tools around electrical equipment. Only trained and qualified individuals may work on electrical equipment.
- Store tools in a safe place. Many accidents have been caused by tools falling from overhead, and by sharp tools carried in pockets or left in toolboxes with the cutting edges exposed. Ensure the tool is put away in the proper place after use and that sharp edges or blades are protected or enclosed to prevent contact.
- Ensure tool handles are wedged tightly in the head of all tools.
- Hand tools such as chisels and punches, which develop mushroomed heads during use, must be reconditioned or replaced as necessary.
- Keep tool cutting edges sharp so the tool will move smoothly without binding or skipping. Dull tools can be more hazardous than sharp tools.
- When using hand tools, maintain a good grip and stand in a balanced position to avoid sudden slips.
- Wear gloves when necessary to protect your hands. However, be cautious of gloves and/or loose materials when using powered tools where they could get caught in a moving part.
- Wear other personal protective equipment as warranted such as eye, face, and hearing protection, respirators, appropriate shoes, etc.
- Keep wood handles free of splinters and cracks.
- Wrenches should not be used if jaws are sprung or loose.
- When using hand tools, ensure area around your work is clean, dry, well lit and free of obstructions when possible.
- When using a screwdriver, do not hold an object in one hand and press a screwdriver into it, place it on a bench or a table.
- Be cautious of spark-producing hand tools when working near flammable materials. Use non-sparking tools when necessary.
- Consider ergonomically designed tools to fit the tool to the worker -- especially those tools that are utilized frequently and repetitively during the day.
- Inspect your tools before each job to ensure proper condition.
Working with Found Objects
The use of found objects from demolition or construction sites as part of an art project can be a productive and enjoyable way of developing perception and imagination. But it can also have its down side if the found object unknowingly contains hazardous materials such as asbestos.

It is not the intent of the Department to discourage the discovery and use of aesthetically useful found objects, but it is important for the student to realize that prudence is required in obtaining and using such materials. It would indeed be tragic if, in the pursuit of an education, your health or that of someone else was unintentionally compromised.

Working with Plaster
A very common medium used in sculpture at Framingham State includes Hydrocal plaster and casting plaster. It is important that you are aware of the hazards associated with these materials. For instance, plaster dust generated from mixing plasters may be irritating to the eyes and respiratory system. Silica sand and vermiculite added to plaster for texture are highly toxic by inhalation and shall be used in moderation. Plaster dust absorbs water rapidly from any moist surface it comes in contact with and can be very irritating to the skin, eyes or respiratory system. Carving of plaster may pose hazards to the eye from flying chips. When casting body parts in plaster, severe burns may result from the heat that is produced during the setting reaction. Careless use and storage of tools may also cause injuries.

The following safety precautions should be observed when working with these materials:

- Wear a NIOSH-approved filter face piece when mixing plasters.
- Vacuum or mop plaster dust so as to not generate dust.
- Always carve or cut in a direction away from your body.
- Wear NIOSH-approved safety goggles when chipping plaster;
- Move all heavy objects using safe lifting techniques. Objects shall be lifted using the legs by bending at the knees and not at the waist.
- Do not cast body parts unless provisions have been made for heat dissipation. Provide a barrier between the skin and the casting material. Ask the faculty for assistance and guidance if performing these tasks.

Working with Wood
Wood is one of the most commonly used materials in art, crafts and home hobbies. Woodworking involves techniques such as carving, laminating, joining, sawing, sanding, paint removing, painting and finishing. Wood sculpture and furniture-making utilizes a large variety of hard and soft woods, including many exotic tropical woods. Many of these woods are hazardous themselves. Sometimes woods are treated with hazardous preservatives or pesticides.

Hardwoods are commonly used in wood sculpture and furniture making. Many rare hardwoods are imported from tropical countries. Some hazards associated with hardwoods include saps present in many green woods, and lichens and liverworts present on the surface of freshly cut wood, can cause skin allergies and irritation from direct contact. Many hardwood dusts, especially those from exotic woods, are common sensitizers and can cause allergic skin reactions. Some hardwoods can cause allergic reactions in individuals working with or using finished hardwoods. Contact with the dust of many hardwoods can cause conjunctivitis (eye inflammation), hay fever, asthma, coughing, and other respiratory diseases. Some hardwoods can cause hypersensitivity pneumonia and frequent attacks can cause permanent lung
scarring. Examples of these highly toxic woods include giant sequoia, cork oak, some maple woods and redwood. Some hardwoods contain chemicals that are toxic and can cause a variety of symptoms including headaches, salivation, thirst, giddiness, nausea and irregular heartbeat. A classic example is hemlock. Inhalation of hardwood dust is associated with a particular type of nasal and nasal sinus cancer, adenocarcinoma. This type of cancer has a latency period of 40-45 years and occurs in seven out of every 10,000 among woodworkers who are heavily exposed. This rate is many times higher than the rate of nasal adenocarcinoma in the general population. Over half of all known cases of this type of cancer are found in woodworkers.

Follow these safety precautions when working with hardwoods:

• Whenever possible, use common hardwoods rather than rare tropical hardwoods.
• People with a history allergies should avoid common sensitizing woods, ask the instructor for guidance in selecting materials for your project.
• Use local exhaust ventilation. If local exhaust ventilation is not feasible, wear a NIOSH-approved respirator
• If you are handling woods that can cause skin irritation or allergies, wear gloves. Wash hands carefully after work.

Softwoods (e.g., pine) are often used. Domestic softwoods are the most common. Softwoods do not cause as high a frequency of skin and respiratory problems as do hardwoods. A few individuals can develop allergic reactions to some softwoods. But certain precautions should be taken when employing these materials (see precautions above).

Plywood is made by gluing thin sheets of wood together with either urea-formaldehyde glues (for indoor use) or phenol-formaldehyde glues (for outdoor use). Composition board (e.g., particleboard) is made by gluing wood dust, chips or other materials together with urea-formaldehyde resins. The materials can emit unreacted formaldehyde for some years after manufacturing with composition board emitting more formaldehyde. In addition, heating these materials or machining them can cause decomposition of the glue to release formaldehyde.

There are certain hazards one may encounter when using plywood including exposure to formaldehyde. Formaldehyde is highly toxic through inhalation, highly toxic through eye contact and ingestion and moderately toxic through skin contact. It is an irritant and strong sensitizer. Formaldehyde is a probable human carcinogen. Even trace amounts of free formaldehyde may cause allergic reactions in people who are already sensitized to it. Machining, sanding or excessive heating of plywood or composition board can cause decomposition releasing formaldehyde, carbon monoxide, hydrogen cyanide (in the case of amino resins) and phenol (in the case of phenol-formaldehyde resins). Use local exhaust ventilation when cutting or sanding plywood or composition board. The following safety protocols should be followed when working with plywood and composition board.

• Use low-formaldehyde products whenever possible. There are particle boards that are made without formaldehyde, but these are very expensive; and
• Do not store large amounts of plywood or composition board in the shop since it will emit formaldehyde. Instead, store in a ventilated area where people do not work.
A variety of glues are used for laminating and joining wood. These include contact adhesives, casein glue, epoxy glues, formaldehyde-resin glues (e.g., formaldehyde-resorcinol), hide glues, white glue (polyvinyl acetate emulsion) and the cyanoacrylate “instant” glues.

Epoxy glues are moderately toxic through skin and eye contact and through inhalation. Amine hardeners (as well as other types of hardeners) can cause skin allergies and irritation in a high percentage of the people using them. Inhalation can cause asthma and other lung problems. Cyanoacrylate glues are moderately toxic through skin or eye contact. They can glue the skin together or glue the skin and other materials together, sometimes requiring surgical separation. Eye contact can cause severe eye irritation. Their long-term hazards are not well studied, especially with respect to inhalation. Formaldehyde-resin glues, Resorcinol-formaldehyde and urea-formaldehyde glues are highly toxic through eye contact and inhalation, and moderately toxic through skin contact. The formaldehyde can cause skin and respiratory irritation and allergies, and is a known human carcinogen. The resin components may also cause irritation. Even when cured, any unreacted formaldehyde may cause skin irritation and sanding may cause decomposition of the glue to release formaldehyde. Formaldehyde can be a problem when working with fiber-board and plywood. Contact adhesives are extremely flammable. Contact adhesives contain hexane which is highly toxic through chronic inhalation causing peripheral nerve damage. Other solvents in contact adhesives are mineral spirits or naphtha, and 1,1,1- trichloroethane (methyl chloroform) which are moderately toxic through skin contact, inhalation and ingestion. Water-based glues, water-based contact adhesives, casein glues, hide glues, white glue (polyvinyl acetate) and other water-based adhesives are slightly toxic through skin contact and only slightly toxic through inhalation or ingestion. Dry casein glues are highly toxic through inhalation or ingestion, and moderately toxic through skin contact since they often contain large amounts of sodium fluoride and strong alkalis.

The following safety precautions shall be followed when gluing wood:

- Avoid formaldehyde resin glues because of allergic reactions and the carcinogenicity of formaldehyde.
- Use water-based glues rather than solvent-type glues whenever possible.
- Epoxy glues, cyanoacrylate glues and solvent-based glues should only be used with good dilution ventilation (e.g., a window exhaust fan). Large amounts of these glues need local exhaust ventilation.
- Eliminate other sources of ignition when using solvent-based glues.
- Wear gloves, goggles and a NIOSH-approved toxic dust mask when mixing dry casein glues.
Section IV. Further Reading on Studio Health and Safety
There are many resources both online and in-print for more detailed information into the chemistry, proper handling and toxicity of artist materials, below is a list of some of the most thorough and respected publications.


