Art 360: Ceramics II

The Discipline of the Wheel: Art Pots

Fort Hays State University
College of Arts, Humanities and Social Sciences
Department of Art and Design
Linda Ganstrom
Graduate Assistant: Bethany Panhorst

1. COURSE INFORMATION

1.1. 3 Credit Hours, Repeatable
1.2. Spring 2021
1.3. Art 360: Ceramics II
1.4. Center for Art and Design 115
1.5. 4:30 – 7:15 pm Tuesday and Thursday

2. INSTRUCTOR INFORMATION

2.1. Instructor Contact Information

b_panhorst@fhsu.mail.edu
912-657-7811
lmganstrom@fhsu.edu
785-628-4273 or 785-342-3584 (cell)

2.2. Contact Procedure and Policy

Please make an appointment 24 hours in advance

2.3. About the Instructor

Linda Ganstrom is a Professor in the Department of Art and Design

2.4. Department Secretary Contact Information

Lauren Sargent, 785-628-4247

3. TEXTBOOK AND COURSE MATERIALS

3.1. No Required Textbooks.

Provided for checkout:
The Potter's Workbook by Clary Illian
High Fire Glazes by John Britt
Recommended and in the class library:
Hands in Clay by John Toki and Charlotte Speight

3.2. Supplementary Handouts and PowerPoints on Blackboard

3.3. Technology Requirement

Devices that allow access to Blackboard and the Internet are helpful. Papers are written in Word.doc format and sent over email.

3.4 Materials and Tools

Studio fee pays for clay, glaze, firing, equipment use, and handouts ($100). This fee is in addition to the fees charged with tuition. Failure to pay the fee results in failing the class. Additional clay may be purchased by students to meet personal needs.

- **Basic Ceramic Tool Kit** (new $12 to $20, a supply can be checked out) Sponge, needle tool, wood tool, loop tool, cut off wire, rib, knife
- Throwing Tools: Plaster turning tool, plastic scraper, calipers, ruler, throwing bats, plastic bucket
- Turntables ($12 - $25, can be checked out)
- 1 yard of heavy canvas (new $3 - $6, can be checked out)
- Paintbrushes ($3 - $5, a supply is provided)
- Safety gear - goggles, face mask, plastic and /or work gloves, work shirt ($5 to $20, limited supply provided)
- Paddle, textures, old toothbrush, a container for slip - old butter tub and lid
- Plastic bags, newspaper, textures

Total cost from $100 to $200

If loaned tools and equipment are not returned, the student will be charged for their replacement value. Accepting the loan means the student is aware and in agreement with this policy.

3.5 Sketchbook/Notebook

Students should have a sketchbook or notebook to collect images and sketch ideas.

4. COURSE DESCRIPTION

4.1. FHSU Catalogue Description

Intensive study of ceramic form and technique

4.2. Instructor Course Description

Designing ceramic forms thrown on the potter's wheel, glazing and firing are the primary focus in this ceramics course. The student should be developing his or her personal voice in clay through throwing, altering and making marks on hollow forms. The student will also be setting up, researching and solving problems in concept, form, surface, iconography, glaze, firing and self-expression in personal series pieces.

Experimentation, research, and extensive ceramic production are vital to artistic growth. Students are required to develop skills at designing form and at wheel throwing and decorating. A body of work reflecting a personal style and content will be developed. Students should also become more aware of the historical and contemporary ceramic scene.

5. COURSE OBJECTIVES

5.1. Course Objectives

A. Research. The student will research, participate in group discussions and workshops in order to gain more ideas about the possibilities of ceramics as an art material. Building a personal vocabulary in art through the use of sketches, an idea file or experimentation is encouraged.

B. Information. The student will be exposed to new techniques, ideas and professional development tools in class. Class time is utilized for demonstrations, discussions, critiques, image presentations and group interaction.

C. Insight. Critiques and small group discussions, as well as personal introspective writing will help students become more aware of the symbolism and layers of meaning their work contains. Subtle understanding of function and design will be developed. "We don't learn from experience, we learn from reflecting on experience."

D. Inspiration. Learning to inspire oneself and develop new works is an attribute of a lifelong artist. Researching art and nature, exploring personal passions, experiences and truths will be used as a catalyst for creating new works.

E. Personal Style. The student will develop in-depth ideas and techniques leading to a body of work suitable for public exhibition.

F. Firing. The student will load his/her work. The student may fire work after receiving training.

G. Glazing. The student should fire a glaze ingredient palette, mix a glaze, then add colorants to develop a new glaze.

5.2. Prerequisites

Art 260: Ceramics I. Instructor can waive this requirement.

This course is designed to be taken as many times as necessary to develop a style and body of work involving ceramics thrown on the wheel. This course focuses on artistic production, research and artistic growth. The course follows a workshop format encouraging students to cooperate and collaborate in learning new skills, glazing and firing.

This course is designed to meet students at their level of artistic development. It will expose students to the broad range of possibilities for self-expression in wheel thrown ceramics. Art education majors should benefit from learning basic skills and studio techniques needed to teach ceramics. Art majors should be able to transfer their personal style and creativity to this exciting, versatile 3-D media. The ability to research, brainstorm, develop an idea, communicate, think critically and improve upon a work of

art will benefit all students. Students should enjoy exploring their creativity in this rewarding, absorbing material, perhaps finding a relaxing hobby. The ceramic major will receive a focused foundation base of ceramic knowledge on which to build his or her personal style in clay.

6. COURSE SCHEDULE

This schedule is tentative and might change during the semester depending on how the course evolves. The content is subject to change depending on students' interest and progress. Students will be notified of the changes through announcements either in the class or at the Blackboard course site

Unit	Form	Surface Technique	Week	Due Dates
1.	BOWLS Project 1: Handbuilding Warm-Up Project 2: Memory Bowls	Drawing, Mishima, Sgraffito	1-4	Project 1 and 2: Feb. 11
2.	CYLINDER Project 3: Emotional Mugs Project 4: Non-Functional Vase	Slip trailing, Paint on Clay Carving, Incising	5-8	Project 3 and 4: March 11
3.	PLATES Project 5: Portrait Plates	Majolica	9-11	Project 5: April 8
4.	FINAL Project 6: Cultural Celebration Vessels	Students Choose	12-15	Project 6: May 11

7. EVALUATION AND GRADING

There are 1000 points for this course. The grade you earn for this course depends on the total number of points you earn throughout the semester. The assessment methods and grading scale are as follows:

Assessment Methods	Points	Percentage
Unit 1: Bowls		
Project 1: Handbuilding Warmup	100	10
Project 2: Memory Bowls	150	15
Unit 2: Cylinders		
Project 3: Mugs	150	15
Project 4: Vase	150	15
Unit 3: Plates		
Project 5: Portrait Plates	150	15

Unit 4: Final		
Project 6: Cultural Celebration Vessels	200	20
Final Presentation	100	10
Total	1000	100

Attendance and Absences. Attendance is crucial to learning in this course. Students are expected to watch demonstrations and participate in guided practice. Observation and practice are crucial for growth in learning.
In the event of sickness, students need to communicate with the instructor. Students can keep up to date on class demonstrations through the Facebook Group. Students may complete projects at home using hand-building techniques or work during open studio hours once they return to campus.

In-class Demonstrations. Techniques for forming, mark making and surface decoration will be demonstrated in class. This is the **technical** learning aspect of class. This is completed primarily in class.

Sketchbook and Images. For each project students are required to gather images and/or create sketches to help develop ideas.

Individual Art Work. Practice and decoration on wheel created forms may require time beyond the regular assignments and is usually completed outside of class-time. Personalized and stylized thrown forms intended for exhibition fulfill this requirement.

Glaze and Firing Investigation. Experimentation with glazes will be conducted. Students will mix glazes and fire kilns. Students will learn the foundation of glazing chemistry and experiment with developing glazes.

Assessment. These assignments are graded on craftsmanship, composition, creativity, glazing and invention. This will be done in class using rubric, conversation and a photographic report.

Final Presentation. Students will create final PowerPoint presentations including photographed pieces and a written reflection statement. Presentations will be due during the final critique.

Cleanup. Students are responsible for cleaning up all areas they used, including their workspace, floor, sinks, glaze room, kiln room. If you use something, please return it to its spot. Any artwork or other items such as tools remaining in the lab after class will become the property of FHSU and will be disposed of after the final class meeting.

Grading Scale

90 - 100 = A
80 - 89 = B
70 - 79 = C
60 - 69 = D
0 - 59 = U

IMPORTANT DATES TO REMEMBER:

Safety Quiz:
Midterm Critique**: March 11th**
Spring Break**: March 22nd-26th**
Last Wet Day**: April 27th**
Final Presentation and Critique**: May 11th**

8. University Policies

11.1. Academic Honesty Policy
Membership in the FHSU learning community imposes upon the student a variety of commitments, obligations and responsibilities. It is the policy of FHSU to impose sanctions on students who misrepresent their academic work. These sanctions will be selected by appropriate classroom instructors or other designated persons consistent with the seriousness of the violation and related considerations... Students participating in any violation of this policy must accept the consequences of their actions. Classroom instructors and/or university review/appeals committees and administrators will assess the sanctions for violation of this policy. The seriousness of the violation will dictate the severity of the sanction imposed. More information can be found at http://www.fhsu.edu/academic/provost/handbook/ch_2_academic_honesty/

11.2. Statement of Accessibility and Services for Students with Disabilities
If you have a disability that may have an impact on your ability to carry out assigned course work and if you wish to seek any accommodations for this course, you must contact Services for Students with Disabilities (SSD). SSD is located in the Kelly Center, Picken Hall, Room 111, 785-628-4401. SSD will review your documentation and determine, with you, what academic accommodations are necessary and appropriate for you that can be accommodated in this course. All information and documentation of your disability is confidential and will not be released by SSD without your written permission. Students can find more information at http://www.fhsu.edu/disability/get-access/ Instructors who need help to create instructional materials for students with special needs can seek help from Learning Technologies (LT), 785-628-4194.

11.3 Title IX
FHSU is committed to fostering a safe, productive learning environment. Title IX makes it clear that violence and harassment based on sex, gender and gender identity are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, etc. This includes all types of gender and relationship violence: sexual violence or harassment, domestic and dating violence, and stalking.

If you wish to speak **confidentially** about an incident of gender and relationship violence, talk to someone at The Kelly Center, the Student Health Center, or the Options Sexual and Domestic Violence Campus Advocate who is housed in the Student Health Center.

If you wish to report an incident or have questions about school policies and procedures regarding Title IX issues, please contact Dr. Keegan Nichols, Associate Vice President for Student Affairs and the FHSU Title IX Coordinator knnichols@fhsu.edu. Or, you can report to Residential Life Staff or University Police, which are **non-confidential reporters.**

If you are unsure about the reporting status of an individual, ask them directly before disclosing sensitive information. If they are non-confidential, they can direct you to someone you can talk to in complete confidentiality, which does not have to be officially reported.

11.4. Use of Computing Resources
Fort Hays State University (FHSU) provides computing resources and worldwide network access to its faculty, staff, and students for legitimate administrative, educational, and research efforts. As a member of the FHSU electronic community it is your responsibility to use computing resources ethically and responsibly. Members of the FHSU electronic community are expected to use computing resources ethically, and to exercise reasonable care in utilization of FHSU information systems or their components. More information related to privacy, responsibilities, things forbidden to do and use of email can be found at
http://www.fhsu.edu/academic/provost/handbook/ch_1_computing_resources/

11.5 Withdrawal Policy
Students may withdraw full-semester courses through 11:59:59PM CT on the 35th day of the semester (Learning Technologies (LT) will work with the Registrar's Office and Technologies Services (TS) to make the specific date for each semester available at the syllabus site). Students withdrawing during this time period will not receive any notation on their transcript. Students who withdraw after this period and thru 11:59:59PM CT on the 70th day of the semester will receive a notation on the transcript of withdrawal (W). No withdrawals after the 70th (LT will work with the Registrar's Office and TS to make the specific date for each semester available at the syllabus site) day of the semester. Students who withdraw completely will receive a notation on their transcript of the date withdrawn. Students receiving financial aid have additional responsibility and should contact the Office of Student Financial Assistance, 785-628-4408.
(http://www.fhsu.edu/registrar/academic-policies-and-information/)

11.6. Proctoring Requirements (Virtual College courses only if applicable)
The Proctor Approval Form for the Virtual College courses along with the student's and the proctor's responsibilities can be found at
http://www.fhsu.edu/virtualcontent.aspx?id=12884902424&terms=proctor

Students have access to academic services, technical support and student services at Fort Hays State University. You can find the resources online at http://www.fhsu.edu/ctelt/services/Student-Help-Resources/

11.7 Statement Regarding Wearing of Face Coverings

To protect the health and safety of the FHSU community, when present on University property, all faculty, staff, students, and visitors must wear face coverings over their mouths and noses when in common areas of a building (including hallways, elevators, public spaces, classrooms, conference rooms, library, and other common areas), and when within six (6) feet of another individual anywhere on University property. Employees and students with a recognized disability that prevents them from wearing a face-covering can contact the Human Resources office (if an employee) or Student Accessibility Services at 785-628-4401 (if a student) to discuss possible accommodations and the appropriate documentation process. In classrooms, faculty have the right to deny a student entry into the room if the student is not wearing a face covering. Students not wearing a face covering will be reminded to do so and offered a clean face covering if one is available. If the student does not comply, the faculty member will ask the student to leave the space, and if available, join the class remotely. As a last resort, campus police may be called. The faculty members will complete the Coronavirus (COVID-19) Concern Reporting Form and the appropriate office will look further into the issue and take the non-compliance with the request to leave into consideration of further accountability measures. At no point should anyone put themselves into an unsafe situation while attempting to enforce the face-covering policy. FHSU campus police: 785-628-5304

Ceramics II Art 360: Art Pots
Detailed Outline

Week 1

Jan. 19

Introduction game
Discuss syllabus and safety rules
Unit 1 introduction: Handbuilt pieces and memory bowls
Homework: gather items to texture clay with, create sketches and images research for memory bowls

Jan. 21

Handbuilding demo
Bowl throwing demo
Student making: Handbuilding and throwing

Week 2

Jan. 26

Trimming demo
Safety Rules Quiz Due
Student making: Throwing and trimming

Jan. 28

Surface Decoration (Drawing/Mishima/Sgraffito) Demo
Student Making: Throwing, trimming, and decorating

Week 3

Feb. 2

Student Making: Throwing, trimming, and decorating

Feb. 4

Finish up bowls
All bowls ready for bisque

Week 4

Feb. 9

Glaze introduction (high-fire) with hump/slump/pinch pieces.
Glaze thrown bowls

Feb. 11

CRITIQUE UNIT 1: Handbuilt pieces and memory bowls

Unit 2 introduction: Mugs and vases
Homework: create sketches and gather images for unit 2 projects

Week 5

Feb. 16
Cylinders/mugs demo
Student making: Throwing Cylinders For Mugs
Feb. 18
Handles demo
Student making: Throwing, trimming, and handles

Week 6

Feb. 23
Slip decoration demo
Student making: Throwing, trimming, handles, and decoration
Feb. 25
Vase demo
Carving/incising demo
Student making: Throwing

Week 7

March 2
Student making: Throwing, trimming, and decorating
March 4
Mugs and vases ready for bisque by the end of class

Week 8

March 9
Glazing Mugs and Vases
March 11
Midterm
CRITIQUE UNIT 2: Mugs and Vases
Unit 3 introduction: Portrait Plates
Homework: create sketches and gather images for unit 3 project

Week 9
March 16
Plate Demo

Student making: Throwing

March 18

Plate Trimming Demo

Student Making: Throwing and trimming

SPRING BREAK: March 22-26

Week 10

March 30

Student making: Throwing and trimming

All plates ready for Bisque

April 1

Majolica Demo

Student making: Majolica glazing

Week 11

April 6

Student making: Majolica glazing

April 8

CRITIQUE UNIT 3: Portrait Plates

Introduce Unit 4: Cultural Celebration Pieces

Homework: create sketches and gather images for unit 4 project

Week 12

April 13

Discuss student project plans

Chip and dip demo

Lidded form demo

Student making: Individual projects

April 15

Student making: Individual projects

Week 13

April 20

Student making: Individual projects

April 22

Student making: Individual projects

Week 14

April 27

Student making: Individual projects

LAST WET DAY: All pieces finished for bisque

April 29

Glaze Project 6: Cultural Celebration Pieces

Week 15

May 4

Last day to Glaze

Photograph Work

May 6

Photograph work

Week 16

May 11

CRITIQUE UNIT 4: Cultural Celebration Pieces

Present Final PowerPoints

Art 360: Ceramics II Name: Date:

Project One. Pinch, Hump, Slump, and Slab

Objective: Students will refresh the basics of hand-building and explore using textures on clay. Students will use practice using texture and glaze to enhance self-expression. Each piece will be used to test various high-fire glazes

January 19 Handbuilding Introduction
Discuss Project. Homework: gather objects for texture
January 21 Handbuilding Demonstration
Make pinch, hump, slump, and slab. Add texture to pieces.
February 9 High Fire Glaze Introduction
Guided learning to create glaze testers
February 11. Project Due
Grade using the rubric below.

Handbuilding Evaluation Rubric

	A 18-20	B 16-17	C 14-15	D 12-13
Objects for Texture /20	**5 or more textures.**	**4 textures**	**3 textures**	**2 or fewer textures**
Form /20	**All four forms, innovative**	**Three forms, personal**	**Two forms, improving, copied**	**Only one form completed, emerging, basic**
Craft /20	**¼", even, expert**	**½", even, improving**	**¾", uneven, emerging**	**1", uneven, beginning**
Design /20	**Surprising, delightful**	**Personal, pleasing**	**Irregular, plain**	**Accidental**
Glazing /20	**Wide variety of glaze combinations, artistic, unique expressive, engaging**	**Developing variety of glazes used, personal, pleasing, well crafted**	**Basic glaze combinations, Handmade, some flaws**	**Limit glaze combinations, unattractive, flawed, undeveloped**
Total /100				

Art 360: Ceramics II Name: Date:

Project Two. Memory Bowls

Objective: Students will begin to build throwing skills. Students will create 5 or more bowls that incorporate personal stories and meaning into their pieces by using the drawing, mishima, and sgraffito surface techniques. Students will use the prompts below as a starting point for the projects.

January 19 Unit Introduction
Discuss project. Homework: sketches and images research
January 21 Throwing Demo
Student making: Throwing
January 26 Trimming Demo
Student making: Throwing and trimming
January 28 Surface Decoration Demonstration
Drawing on clay, mishima, sgraffito
Student making: Throwing, trimming, and decorating
February 2
Student Making: Throwing, trimming, and decorating
February 4
Finish up all bowls
All bowls ready for bisque by the end of class
February 9 Glaze Day
Glaze bowls using high fire glazes.
February 11 Critique
Grade using the rubric below.

Memory Bowls Prompts

Use these prompts to help guide you to create bowls that convey memories. Feel free to expand and come up with your own prompts.

- Draw a place to which you can no longer return
- When was a moment that you were extremely happy?
- Conversely, what was a difficult moment in your life?
- A moment of realization that helped you grow
- A favorite vacation
- What is a nostalgic smell, color, texture?
- When you think of childhood you think of…

Memory Bowls Evaluation Rubric

	A 27-30	B 24-26	C 21-23	D 18-20
Research /30	**10 or more sketches/ photographs, inspirational research**	**7-9 sketches/ photographs, motivating research**	**6-7 sketches/ photographs, basic research**	**5 or Fewer sketches/ photographs, limited**
Form /30	**5 or more bowls, innovative, delightful**	**4 bowls, personal, pleasing**	**3 bowls, Improving, irregular, plain**	**2 or fewer bowls, accidental, basic**
Craft /30	**¼", even, expert**	**½", even improving**	**¾", uneven emerging**	**1", uneven beginning**
Concept /30	**Surprising, original**	**personal, thoughtful**	**copied, uninvolved**	**Minimal thought, lacking effort**
Surfaces /30	**All three surfaces, artistic, unique expressive, engaging**	**2 surfaces tried, personal, pleasing, well crafted**	**2 surfaces tried, handmade, some flaws**	**Only one surface technique, unattractive, flawed, undeveloped**
Total /150	**Grade**			

Art 360: Ceramics II Name: Date:

Project Three. Emotional Mugs

Objective: To create at least six mugs expressing different emotions. Students should use colored slip, glaze, and form to express a variety of feelings.

February 11 Unit Introduction
Discuss project. Homework: sketches and images research
February 16 Cylinder Demonstration
Student making: Throwing cylinders for mugs
February 18 Handles Demo
Student making: Throwing, trimming, and handles
February 23 Slip Decoration Demo
Student making: Throwing, trimming, handles, and decoration
March 4
Mugs ready for bisque by the end of class
March 9 Glazing
Glaze mugs
March 11 Critique
Grade project using the rubric below

Emotional Mugs Prompts

Think about how color, texture, and line can create a feeling. Are there certain colors or certain shapes you associate with certain emotions? Are there textures that are inviting? Are there textures that are repulsive to you?
Here is a list of some emotions to get you thinking.

Mirth
Grief
Fear
Anger
Jealousy
Emptiness
Joy
Hate
Shame
Contentment
Peaceful

Optimism
Excitement

Emotional Mugs Evaluation Rubric

	A 27-30	B 24-26	C 21-23	D 18-20
Research /30	**10 or more sketches/ photographs, inspirational research**	**7-9 sketches/ photographs, motivating research**	**6-7 sketches/ photographs, basic research**	**5 or Fewer sketches/ photographs, Limited research**
Form /30	**6 or more mugs, innovative, delightful**	**4-5 mugs, personal, pleasing**	**3 mugs, Improving, irregular, plain**	**2 or fewer mugs, accidental, basic**
Craft /30	**¼", even, expert**	**½", even improving**	**¾", uneven emerging**	**1", uneven beginning**
Concept /30	**Surprising, original**	**personal, thoughtful**	**copied, uninvolved**	**Minimal thought, lacking effort**
Surfaces /30	**Artistic, unique expressive, engaging**	**Personal, pleasing, well crafted**	**Handmade, some flaws**	**Unattractive, flawed, undeveloped**
Total /150	**Grade**			

Art 360: Ceramics II Name: Date:

Project Four. Non-Functional Vases

Objective: To create two vases that are strictly sculptural serving no purpose other than decoration and the communication of ideas.

February 11 Mugs and vases

Homework: create sketches and gather images for vases

February 25

Vase demo

Carving/incising demo

Student making: Throwing

March 2

Student making: Throwing, trimming, and decorating

March 4

Student making: Throwing, trimming, and decorating

All vases ready for bisque by the end of class

Non-Functional Vases Questions

- What makes a piece of pottery strictly decorative? Level of craft, openings in the form?
- Is a highly crafted piece more likely to be decorative than a piece with less skill?
- How might the surface contribute to peoples' perception of the function of the piece?

Non-Functional Vases Evaluation Rubric

	A 27-30	B 24-26	C 21-23	D 18-20
Research /30	**10 or more sketches/ photographs, inspirational research**	**7-9 sketches/ photographs, motivating research**	**6-7 sketches/ photographs, basic research**	**5 or Fewer sketches/ photographs, limited research**
Form /30	**2 or more vases, innovative, delightful**	**2 vases, personal, pleasing**	**Only one vase, Improving, irregular, plain**	**Only one vase, accidental, basic**
Craft /30	**¼", even, expert**	**½", even improving**	**¾", uneven emerging**	**1", uneven beginning**
Concept /30	**Surprising, original**	**personal, thoughtful**	**copied, uninvolved**	**Minimal thought, lacking effort**
Surfaces /30	**Artistic, unique expressive, engaging**	**Personal, pleasing, well crafted**	**Handmade, some flaws**	**Unattractive, flawed, undeveloped**
Total /150	**Grade**			

Art 360: Ceramics II Name: Date:

Project Five. <u>Portrait Plates</u>

Objective: Students will create five or more plates using terracotta clay that depicts or expresses the characteristics of a particular individual or individuals. Students will use majolica glaze to complete the surface project.

March 11 Unit 3 introduction: Portrait Plates

<u>Homework: create sketches and gather images for unit 3 project</u>

March 16 Plate Demo

Student making: Throwing

March 18 Plate Trimming Demo

Student Making: Throwing and trimming

March 30

Student making: Throwing and trimming

All plates ready for Bisque

April 1 Majolica Demo

Student making: Majolica glazing

April 6

Student making: Majolica glazing

April 8 Critique

Grade project using the rubric below.

Portrait Prompts

Who are they?

What makes them unique or stand out?

What is important to them?

Why are they important to you?

Portrait Plates Evaluation Rubric

	A 27-30	B 24-26	C 21-23	D 18-20
Research /30	**10 or more sketches/ photographs, inspirational research**	**7-9 sketches/ photographs, motivating research**	**6-7 sketches/ photographs, basic research**	**5 or Fewer sketches/ photographs, limited research**
Form /30	**5 or more plates, innovative, delightful**	**4 plates, personal, pleasing**	**3 plates, Improving, irregular, plain**	**2 or fewer plates, accidental, basic**
Craft /30	**¼", even, expert**	**½", even improving**	**¾", uneven emerging**	**1", uneven beginning**
Concept /30	**Surprising, original**	**personal, thoughtful**	**copied, uninvolved**	**Minimal thought, lacking effort**
Surfaces /30	**Artistic, unique expressive, engaging**	**Personal, pleasing, well crafted**	**Handmade, some flaws**	**Unattractive, flawed, undeveloped**
Total /150	**Grade**			

Art 360: Ceramics II Name: Date:

Project Six. Cultural Celebrations

Objective: Students will create a personal set of ceramic ware that is meaningful to them. For example, ceramic pieces can relate to a cultural event or use traditional form. Students will glaze pieces determined by function and personal style.

April 8

Introduce Unit 4: Cultural Celebration Pieces

Homework: create sketches and gather images for unit 4 project

April 13

Discuss student project plans

Chip and dip demo

Lidded form demo

Student making: Individual projects

April 15

Student making: Individual projects

April 20

Student making: Individual projects

April 22

Student making: Individual projects

April 27 Last Wet Day

Student making: Individual projects

LAST WET DAY: All pieces finished for bisque

April 29 Glazing

Glaze Project 6: Cultural Celebration Pieces

May 11 Critique

Critique Cultural Celebration projects using the rubric below

Cultural Celebration Prompts

Use these prompts to help guide you to create ceramic pieces that celebrate culture. Feel free to expand and come up with your own prompts.

- What is an important holiday for you?
- Do you have any unusual family traditions?
- Do you have a unique heritage?
- Do you have any favorite recipes? Could you make a dish to hold that particular dish?

Cultural Celebration Evaluation Rubric

	A 36-40	B 32-35	C 28-31	D 24-27
Research /40	**10 or more sketches/ photographs, inspirational research**	**7-9 sketches/ photographs, motivating research**	**6-7 sketches/ photographs, basic research**	**5 or Fewer sketches/ photographs, limited research**
Form /40	**Unified group of pieces, excellent function, innovative, delightful**	**Forms relate to function, personal, pleasing**	**Some disunity in form and function, improving, irregular, plain**	**Non-related pieces, lacks function, accidental, basic**
Craft /40	**¼", even, expert**	**½", even improving**	**¾", uneven emerging**	**1", uneven beginning**
Concept /40	**Surprising, original, clear**	**Personal, thoughtful**	**Copied, uninvolved**	**Minimal thought, lacking effort and clarity**
Surfaces /40	**Artistic, unified with form, unique expressive, engaging**	**Personal, pleasing, fits with form, well crafted**	**Fits with form, handmade, some flaws**	**Clashes with form, unattractive, flawed, undeveloped**
Total /200	**Grade**			

Safety Rules for Ceramics

General

Think before you act. If it looks dangerous, don't do it or ask the instructor. Do not ask another student, as they may not know the correct safety procedures or may just give you bad advice.
No smoking in the Ceramics Lab. Dust floats on smoke and you are much more likely (90 percent) to develop lung problems if you smoke in the lab.
Wash your hands after working with clay or glaze. Do not ingest or inhale the clay and glaze materials.
Never throw clay or shake dirty canvas, keep the clay out of the air.
Do not eat or drink in the lab.
Never bring children into the lab.
Only those enrolled in the class can work in the lab.

Housekeeping

Each student is responsible for cleaning up after themselves. This includes all areas you have worked in – tables, floor, spray booth, sink, wheels. The cleaner the lab is, the safer it is. Please be respectful of others using the lab.
Immediately wipe up any spills to avoid a slipping accident.
Always mop floors. Do not sweep the floors and put dust into the air.
Never use glass containers in the lab. Glass is slippery when wet and breaks easily if it falls to the concrete floors.
Working on canvas allows for easier cleanup.
Wear an apron or work shirt to protect your street clothes and keep dust from leaving the lab.

Wheels

Turn the wheels off when not in use. Unplug them before mopping.
Keep electrical cords away from water. Plug the wheels into the pole.
Do not plug a cord into the socket with wet hands or while standing in water.
Keep loose clothing or long hair away from the revolving wheel head.
Read instructions or ask directions from the instructor before using the wheels or other pieces of equipment. If the instructor is not available, wait until you get the help you need.
Clean the wheel and the area around it after you use it.
Clean and return the bats to their rack. Place wet bats under others so they will dry flat.

Grinder

Wear goggles, gloves, a dust mask, and keep your hair and clothing pulled back when using the grinding wheel.

Work below the halfway point of the wheel head.
Make sure others are well away from the grinder before you begin using it.
Hold on tightly to the object you are grinding.

Kilns

Never sit anything on the kiln lids.
Never touch the outside of the kiln when it is firing.
Never touch the electrical elements.
Never load, unload, or run the kiln alone unless you have received training and permission from the instructor.
Lift the kiln shelves with bent knees to protect your back.
Use two hands on the outside rim of the shelves when loading for control.
Never look into the peepholes of the kiln without dark shades glasses (shade number 1.7 to 3.0).
Never unload a kiln unless it is under 400 degrees.
Wear gloves when unloading hot pots.
Drink lots of water and take breaks from the kiln room when you are firing a gas kiln to avoid dehydration.
Do not hang out in the kiln room when the kilns are firing.
Be sure to turn on the ventilation fans to remove the gases, including carbon monoxide and sulfur dioxide from the firing kilns.
Stay in the lab with the kiln while it is firing.
Check the kiln when it is warming up with one element on low and the lid propped open. It should not get warmer than 200 degrees. If it is warmer, get the instructor or turn it off.
Stay with the kiln at the end of the firing to be sure it turns off. If it does not turn off at the end of the firing, get the instructor or turn it off manually at the switches. If that does not turn it off, pull the breaker switch by that kiln.

Slab Roller

Keep all hands away from the rolling pin.
Stand clear of the bed while rolling slabs, black grease coasts the steel cables.
Never roll the wheel fast; the steel cables may snap and fly out, endangering you and ruining the roller.

Glazes and Spray Booth

Face masks should be worn when using the spray booth, mixing clay or glaze and when using the grinder. The best practice is to keep one in a plastic bag in your locker and use it when needed.

Never stick your hands in a liquid glaze. Some chemicals can be absorbed through the skin.
Always turn the exhaust fan on when spraying glaze and close the doors to the room. Avoid filling the room with glaze dust.
Wash your hands well after glazing.
Shower after glazing to remove glaze dust from your hair and skin.
Never eat clay or glaze.
Never spray lead glazes
Wear rubber-type gloves and a dust mask when mixing glazes.
Use only plastic jars in the spray guns – glass breaks easily.
Clean the guns immediately after using them by running water through the spray nozzle. Turn off the air and fan. Clean up the turntable.
Put unused glaze back in the glaze bucket and cover the bucket with a lid. Put the glaze back up on the shelf. Leaving buckets on the floor would be dangerous to children – both for drowning and tasting.
Wipe up any glaze spilled on the floor to avoid a slipping hazard.

Pug Mill

Keep hands out of the pug mill while the motor is running. The blades will cut off fingers or severely cut your hand.
Do not operate the pug mill alone.
Do not operate the pug mill unless you have received training in operating and cleaning the machine and have a partner and permission.
Locate the safety shutoff switch on the pug mill and practice shutting it off and on. The switch or safety bar should be turned off at once in case of an accident.
Keep your phone in the clay mixing room with you so you can call for help if needed.

Raku Firing

Wear a non-flammable safety outfit that covers your entire body. Heavy denim jeans and a leather or wool coat or heavy cotton work shirt or sweatshirt are good protection.
Keep your hair pulled back and under a hood.
Wear heat resistant gloves.
Wear leather style footwear – tennis shoes or work boots. Absolutely no sandals or flip-flops.
Wear a welder's face shield and keep the hood down.
Keep the lid between you and the can to act as a shield.
Put the lid back on the can full of ashes after firing. Put a brick on the lid and place it back on the rack so water will not rust it out.
Never throw embers into the dumpster. It will catch the whole dumpster on fire. If this happens pour water on the fire or call 911.

Always turn the kiln off at the breaker, if raku firing out of an electric kiln.
Never touch the elements with the metal tongs.

Gas Kilns

70. Receive training and shadow another fire master before firing the kiln on your own.
Be sure the gas gauges are in the off position before firing.
Be sure the dampers are open before firing.
Be sure the door is unlocked before turning the gas kiln on.
Stay in attendance with the kiln during the firing.
Be sure the kiln and gas gauges are off and the dampers are shut before leaving the kiln after the firing.
Leave your name and phone number on the firing log by the kiln if you are firing the gas kiln.

Summary

Attend all classes so you see demonstrations of equipment use and safety precautions.
If you get tired, stop, and rest. Most accidents occur when you are tired or in a hurry.
Use your common sense to avoid open and obvious dangers.
If you see something you think may be a hazard or see a technical problem call the instructor at home: 785-628-8678.
If you see a fire, injury, or emergency, call 911.

Quiz on the Safety Rules for Ceramics Name_____

General

_____before you act. If it looks dangerous, don't do it or ask the instructor. Do not ask another student, as they may not know the correct safety procedures.

____ smoking in the Ceramics lab. Dust floats on smoke and you are much more likely (90 percent) to develop lung problems if you smoke in the lab.

_____ your hands after working with clay or glaze. Do not ingest or inhale the clay and glaze materials.

Never _____ clay or shake dirty canvas, keep the clay out of the air.

Do _____ eat or drink in the lab.

_____ bring children into the lab.

Only those enrolled in class can work in the _____.

Housekeeping

Each student is responsible for cleaning up after _____. This includes all areas you have worked in – tables, floor, spray booth, sink, wheels. The cleaner the lab is, the safer it is. Please be respectful of others using the lab.

Immediately wipe up any spills to avoid a _____ accident.

Always mop floors. Do not sweep the floors and put dust into the _____.

Never use _____ containers in the lab. Glass is slippery when wet and breaks easily if it fall to the concrete floors.

Working on _____ allows for easier cleanup.

Wear an apron or work shirt to protect your street clothes and keep dust from leaving the _____.

Wheels

Turn the wheels _____ when not in use. Unplug them before mopping.

Keep electrical cords away from water. Plug the wheels into the _____.

Do not plug a cord into the socket with _____ hands or while standing in water.

Keep loose clothing or long_____ away for the revolving wheel head.

Read instructions or ask directions from the instructor _____ using the wheels or other pieces of equipment. If the instructor is not available, wait until you get the help you need.

Clean the wheel and the area around it _____ you use it.

Clean and return the bats to their rack. Place wet bats _____ others so they will dry flat.

Grinder

_____ goggles, gloves, a dust mask and keep your hair and clothing pulled back when using the grinding wheel.

Work _____ the halfway point of the wheel head.

Make sure others are well ____ from the grinder before you begin using it.

Hold on _____ to the object you are grinding.

Kilns

Never sit anything on the kiln _____.
Never touch the outside of the kiln when it is _____.
Never _____ the electrical elements.
Never load, unload or run the kiln _____ unless you have received training and permission from the instructor.
Lift the kiln shelves with _____ knees to protect your back.
Use _____ hands on the outside rim of the shelves when loading for control.
Never look into the peep holes of the kiln _____ dark shades glasses (shade number 1.7 to 3.0).
Never unload a kiln unless it is under _____ degrees.
Wear _____ when unloading hot pots.
Drink lots of water and take breaks from the kiln room when you are firing a gas kiln to avoid _____.
Do not hang out in the kiln room when the kilns are _____.
Be sure to turn the ventilation fans ____ to remove the gases, including carbon monoxide and sulfur dioxide from the firing kilns.
Stay with the kiln while it is _____.
Check the kiln when it is warming up with one element on low and the lid propped open. It should not get warmer than _____ degrees. If it is warmer, get the instructor or turn it off.
Stay with the kiln at the end of the firing to be sure it turns off. If it does not turn off at the end of the firing, get the instructor or turn it off manually at the switches. If that does not turn it off, pull the _____ switch by that kiln.

Slab Roller

Keep all _____ away from the rolling pin.
Stand clear of the bed while rolling slabs, black _____ coasts the steel cables.
Never roll the wheel _____; the steel cables may snap and fly out, endangering you and ruining the roller.

Glazes and Spray Booth

Face _____ should be worn when using the spray booth, mixing clay or glaze and when using the grinder. The best practice is to keep one in a plastic bag in your locker and use it when needed.
Never stick your _____ in liquid glaze. Some chemicals can be absorbed through the skin.
Always turn the exhaust fan _____ when spraying glaze and close the doors to the room. Avoid filling the room with glaze dust.
_____ your hands well after glazing.
Shower after glazing to remove glaze dust from your _____ and skin.
Never _____ clay or glaze.
Never _____ lead glazes
Wear rubber-type gloves and a dust mask when _____ glazes.
Use only _____ jars in the spray guns – glass breaks easily.

Clean the guns _____ after using them by running water through the spray nozzle. Turn off the air and fan. Clean up the turntable.
Put unused glaze back in the glaze bucket and cover the bucket with a _____. Put the glaze back up on the shelf. Leaving buckets on the floor would be dangerous to children – both for drowning and tasting.
Wipe up any glaze spilled on the floor to avoid a _____ hazard.

Pug Mill
Keep _____ out of the pug mill while the motor is running. The blades will cut off fingers or severely cut your hand.
Do not operate the mill _____.
Do not operate the pug mill unless you have received _____ in operating and cleaning the machine and have a partner and permission.
Locate the safety _____ switch on the pug mill and practice shutting it off and on. The switch or safety bar should be turned off at once in case of an accident.
Keep your _____ in the clay mixing room with you so you can call for help if needed.

Raku Firing
Wear a non-flammable _____ outfit that covers your entire body. Heavy denim jeans and a leather or wool coat or heavy cotton work shirt or sweatshirt are good protection.
Keep your _____ pulled back and under a hood.
Wear _____ resistant gloves.
Wear leather footwear – tennis shoes or work boots. Absolutely no _____ or flip-flops.
Wear a welder's _____ shield and keep the hood down.
Keep the lid between you and the can on fire to act as a _____.
Put the _____ back on the can full of ashes after firing. Put a brick on the lid and place it back on the rack so water will not rust it out.
Never throw _____ into the dumpster. It will catch the whole dumpster on fire. If this happens throw water on the fire or call 911.
Always turn the kiln _____ at the breaker, if raku firing out of an electric kiln.
Never touch the elements with the _____ tongs.

Gas Kilns
70. Receive training and _____ another fire master before firing the kiln.
Be sure the gas gauges are in the _____ position before firing.
Be sure the dampers are _____ before firing.
Be sure the door is unlocked before turning the gas kiln ____.
Stay in attendance with the kiln _____ the firing.
Be sure the kiln and gas gauges are off and the dampers are shut before leaving the kiln_____ the firing.
Leave your _____ and phone number on the firing log by the kiln if you are firing the gas kiln.

Summary

Attend ____ classes so you see demonstrations of equipment use and safety precautions.

If you get tired, _____ and rest. Most accidents occur when you are tired or in a hurry.

Use your common sense to avoid open and obvious _____.

If you see something you think may be a hazard or technical problem call the instructor at _____ 785-628-8678.

If you see a fire, injury or emergency, call _____.

Ceramic Materials and Processes

Basic Ceramic Process

1. Prepare the clay. De-air it by **wedging** with a ram's head or spiral method. Cut and slab methods can release clay dust into the air. Check the clay for plasticity with the coiled ring test over a finger.

2. **Form** the wet or plastic clay. There are only a few basic ways of forming, but many variations. Modeling solid clay, pinching, coiling, slab construction, wheel throwing and molding are the six basic forming techniques.

3. Let the clay stiffen to **leather-hard**, then hollow, carve or draw additional details. When the form is completed, allow the moisture to even out under plastic. Be sure to check that the form is **ventilated** and signed.

4. When the piece is even in moisture, dry it evenly to avoid uneven shrinking which causes cracking. A paper tent works well for even drying. The clay should shrink about 5% to 10% in air drying.

5. When dry, the **green-ware** clay will be warm or about room temperature to the touch. Place it in the bisque kiln carefully as it is in its most fragile stage. Do not hold it by a rim or handle. Put a hand under its bottom to support the piece. The clay pieces may touch each other and the kiln furniture, but must stay away from the elements.

6. Fire the **bisque** kiln under the boiling point of water (around 200 degrees) for at least 12 hours for every ½ inch thickness of clay. This removes the physical water and avoids steam blowing up the piece. The bigger the piece, the longer it should be dehydrated, and the slower it should be fired.

7. If firing an electric kiln to bisque, place the proper cone in the cone sitter, reset the timer, and push the button to turn the kiln on. Turn the bottom element on low, the others should be in the off position. Prop the lid open with a soft brick to keep it open 4". The light should be on.

Fire under 200 degrees for at least 12 hours to dry the work.
Turn all elements to low and fire for at least one hour.
Turn all elements to medium and fire for at least one hour.
Turn all elements to high and fire for at least one hour.

Shut the lid, plug the peepholes, and fire the kiln until the temperature is reached.
Turn it off.
Let it cool for 12 hours or until it is under 400 degrees before unloading.

8. During the firing and cooling the clay shrinks again, so slow firing and cooling protect the clay and kilns from cracking.

9. **Bisque** pieces have been fired once to a temperature high enough to make them strong enough for glazing, but they are still absorbent. They will be pale, stoneware will be pink, brittle, hard and absorbent.

10. The next step is to finish the surface. **Glazing** is the most common surface finish on ceramics. To glaze, all the glazes must melt at the same temperature. Never chose a lead glaze for an eating surface. Functional pottery is most safe and durable if fired with high temperature stoneware glazes. Apply 1/32 inch of glaze to form a skin on the piece that is usually three coats with a brush, one dip or about 20 thinly sprayed coats.

11. **Dry-footing. Clean the foot** or bottom of the piece so it is free of glaze, this is called dry-footing. If using a runny glaze, dry foot up the side of the piece as well.

12. Be sure the kiln shelves are covered with **kiln wash** to protect them from glaze mishaps. Stack the glazed pieces on the shelves. They may not touch each other or the kiln furniture. They must not touch the kiln walls or elements.

13. Glaze firing in an electric kiln with dry pieces can be done faster than bisque firing.
Turn one element on low and prop the lid open for one hour to ensure the glazes are dry.
Turn all elements to high, plug the peep holes, close the lid and fire.
Be sure to watch the kiln to see that it turns off.
Cool until the kiln is cool to the touch or at least under 400 degrees.
Some glazes must stay in the kiln until they are room temperature to avoid cracking.

If high firing the glaze, the piece can shrink another 10%.

Clay and Clay Bodies

The term **clay** will be used to refer to materials of a plastic nature that are formed by natural forces and are found in nature. The term **clay body** will be used to indicate a mixture of clay-like materials.

Types of Clays

There are two basic types of clay:
Residual or Primary
Sedimentary or Secondary

Certain types of clay form by chemical decay of the feldspars in igneous rocks. The clay may remain in place and form a residual deposit, or it may be transported by water and accumulate as a sedimentary deposit.

Residual Kaolin is a primary clay and the closest to theoretical clay: Al_2O_3 $2SiO_2$ $2H_2O$. Residual clays do not travel far from the source of their granite and are extremely rare. Kaolin can also be sedimentary.

Georgia Kaolin is the most common kaolin in use in the United States. When a clay or glaze recipe calls for Kaolin, this is the material you would use. The following paragraph is the story of how Georgia Kaolin was created from: http://www.kaolin.com/geology/index.htm:

Commercially, kaolin comes in several brands:
English Grolleg. Plastic
Florida EPK. Very plastic.
Georgia Kaolin
Calcined Georgia. Fired to reduce shrinkage
#6 Tile Clay. Air floated kaolin or high green strength.
Glomax LL, Calcined Kaolin, Replaces Ajax SC
Kaopaque #20. Grolleg substitute. Non-plastic kaolin
Sapphire Clay. A very plastic white clay from Georgia. Substitute for #6 Tile Clay
T7 Kaolin. A cream white clay from Georgia. Good for kiln wash.
Molochite (22 mesh) is a fine texture porcelain grog. It is used to maintain the white color in porcelain where more tooth is required.

Sedimentary clays or secondary clays have been transported far from their feldspathic source and deposited in beds. As a result of this erosion, they are fine-grained and more plastic, but less pure than primary clay.

Earthenware (Red Clay)

Natural earthenware deposits are usually found in outcroppings or in sedimentary patches along streams or rivers. You may also discover these clays along highways that cut through layers of secondary earth. This sedimentary clay is probably the most common clay in nature where numerous lower melting inclusions (impurities such as alkalies and iron) lower its maturation temperature. We use the term 'flux' to refer to the lowering of melting temperatures. Earthenware clays melt at such low temperatures that they seldom become vitreous and the ware continues to be porous after firing (1850 deg. F/1010 deg. C). For this reason, the work is usually glazed if it is to contain liquids. The body usually fires a dark red because of the high iron content in the clay.

Cedar Heights Red Art is a brand of high iron content secondary clay used where a low-temperature clay is required. It fires red-brown and shrinks 14% at cone 1. It is clean-burning, but not very plastic.

Earthenware Clay (Low-fire White or Buff Clay)

We should note that recent interest in low firing techniques have given rise to the use of the term earthenware when talking about any clay body which has been formulated to mature at the earthenware temperature range. The origin of these white clays can be traced to Europe and the early efforts to duplicate the imported porcelain which was being traded from the Orient. These European clay bodies (Soft-Paste Porcelain, bone china, etc.) were formulated using large quantities of fluxing inclusions, lowering the melting temperature for the relatively clean mixtures of kaolin and ball clays. The best descriptive term for this kind of clay body is 'low-fire clay' or 'low-fire whiteware' in order to distinguish it from red earthenware in nature. Another term, 'white earthenware,' is also used to distinguish the man-made clay bodies from the red earthenware of nature.

BASIC NOTES ON CLAYS AND CLAY BODIES by Robert Fromme

Ball Clay is a name for a group of plastic, high-temperature clays used with other clays to **improve the plasticity and to increase the strength of clay bodies**. Robert Fromme writes that in the thousands of years past, in the swamps and low flat lands, these clays seem to have been laid down along with organic layers which would later be mined as coal. The name 'ball clays' comes from the practice in the mines involving the removal of layers of clay from the coal deposits. It seems that the clay was rolled into balls, loaded onto the back of the pack animals or carts, and transported out of the area where the coal was being mined. Like most

sedimentary clays, the ball clays have fine particles. They are very plastic and are important additions for clay bodies used in throwing and other forming techniques.

Although the ball clays are often good additions to other clay bodies to add plasticity, there are some problems which we should keep in mind. With the fine particle size, the shrinkage and tightness of the body create forms that often shrink a great deal, dry slowly, and do not allow for the passage of steam out of the ware in the early stages of the fire. Ball clays in excess may add a sticky quality to a clay body. Also, the amounts of organic material (coal dust, etc.) and extra sulfur present in ball clay accounts for its brown color and early firing odors. In spite of the dark raw color, the clays are usually fairly low in iron and other impurities and fires to a light buff color. Alkalies and other lower melting impurities, as well as the small particle size of the ball clays, render the materials lower in maturation temperature than the cleaner kaolins (china clay). Ball clays
mature at around (2345 deg. F / 1285 deg. C). Ball clays can be found in many locations and the commercial locations of extensive mining are in Tennessee and Kentucky. Kentucky Ball Clay, Old Mine No. 4 is quite pure and may be found in many raw batch weight glaze recipes as well as in some porcelain formulas to help increase plasticity.

BASIC NOTES ON CLAYS AND CLAY BODIES by Robert Frommehttp://grafik.sdsu.edu/ceramicsweb/articles/glaze_tech/basic_clays.html

Commercial brands of Ball Clays include:

OM4 – Old Mine #4. A Kentucky ball clay with high plasticity. 15% shrinkage at cone 10.

Kentucky Ball Clay. Very white and plastic clay with clean burnouts.

Cedar Heights Gold Art. A very plastic air-floated secondary clay used in clay bodies where ball clay or fire clay is called for. Fires a light cream color. 7 % shrinkage at cone 8.

Old Hickory. Light gray in color. 13% shrinkage at cone 10.

Tennessee #1 SGP. White firing. Plastic. 14% shrinkage at cone 10.

Gold Label. A substitute for Foundry Hill Crème which is discontinued. Very plastic with a creamy or banana color.

Spinks Ball Clay. White. Plastic. Good thermal shock quality.

XX Saggar. A Kentucky ball clay.

Stoneware Clay

Stoneware clays are even less pure than the ball clays. Some of the impurities, calcium, alkalies, iron, and feldspar drop the maturation temperature a bit lower (2300 deg. F / 1262 deg. C). The fired color for these clays becomes much darker because of the **additions of metals like iron** in the sedimentary mix. One additional difference between the ball clays and stoneware clays

involves the size of their particles. Here, ball clay usually beats the stoneware in plasticity and finer particle size.

In the raw form, stoneware clays usually require the addition of other clays and chemicals to adjust their properties to match the demands of specific forming techniques. The adjustments usually involve lowering shrinkage, improving plasticity fired color, texture, and adjusting for a specific maturation temperature.

BASIC NOTES ON CLAYS AND CLAY BODIES by Robert Fromme

Commercial varieties include:
Jordan Stoneware. A plastic stoneware. 6 to 7 % shrinkage at cone 10.
Yellow Banks #401. An air floated stoneware clay. Very plastic with low sulfur content. Can be a substitute for GoldArt.

Fire Clay

These high firing clays contain some iron. Physical characteristics vary from plastic to **coarse and granular**. Most fireclays are characterized by large particle size (low plasticity), elevated maturation temperature (2650 deg. F / 1454 deg. C), and large inclusions of impurities such as iron. Their inclusion with other clays raise the maturing point for the clay body, lesson drying shrinkage, open the body so it will dry quicker, add color and texture but lesson plasticity.

Commercial varieties include:

A.P. Green. 28 mesh. A refractory clay, light cream in color. 11% shrinkage at cone 10.

Cedar Heights Fire Clay. 12 to 200 mesh. A plastic coarse-grained fireclay. Fires buff-grey. 10% shrinkage at cone 10. Medium plasticity and good strength. High sulfur released during firing.

Hawthorne Bond Fireclay. 30 mesh. Light fired color. 10 % shrinkage at cone 10. Good plasticity and fine particle size.

Kyanite or Mullite (calcined kyanite). A super duty refractory that aids in manufacturing a mechanically strong clay body. Tremendous resistance to thermal shock.

Grog. A hard, fired kaolin clay is crushed to mesh size and added to clay bodies to add strength and reduce shrinkage. It also opens the body for rapid, even drying.

Volcanic Clay

We have various kinds of clays of volcanic origin and all of them ensue from the weathering of volcanic glass or deposits of volcanic ash. Their particle size ranges from that of most clays to some of the finest of all clay particles.

Bentonite, the most common volcanic clay ($Al_2O_3.4SiO_2.H_2O$), is often used as a plasticizer for other clay bodies. At four to five times more plasticity than other clays, only a small percentage (2-3%) is needed to add workability to another clay body that is in need of plasticity.

Bentonite should always be added to the dry ingredients of a glaze or clay (body) before adding water, or it should be thoroughly slaked (or blended in a blender) with a portion of the water to be added to the clay. If you do not do this, you will be forced to struggle with a gummy mass of bentonite, which will not mix into the other ingredients easily.

Bentonite in a glaze (1-3%) will help hold most glazes in suspension, assist glaze adhesion, and harden the dry surface without noticeably affecting the fired glaze.

BASIC NOTES ON CLAYS AND CLAY BODIES by Robert Fromme

Clay Bodies

A clay body is a mixture of clays blended to meet a potter's special needs. It may sometimes contain non-clay ingredients such as grog or silica sand, even organic materials such as sawdust.

When choosing a clay body there are several things a potter should consider:
Temperature Range. How hot can your kiln fire? What is the purpose of the finished product, if it is to be functional, a high fire clay would be needed.
Shrinkage. How much does the particular clay shrink?
Plasticity or workability. What forming method do you plan to utilize? If you plan to throw or coil build, the clay should be plastic. If forming in a mold or slipcasting, plasticity is as important.
Color. What color will the finished product appear?
Glaze compatibility. What glazes do you plan to use? Will this clay work with those glazes?
Price. Can you afford the clay? Can you purchase it locally, or will you have to pay to have it shipped to your area? As clay is heavy, shipping might cost more than the material.

After you purchase a clay body, you might want to test it, in order to learn its qualities, strengths, and weaknesses. **Shoji Hamada**, the most important Japanese potter of the twentieth century claimed it took him 20 years to learn to use his clay properly. And that was because it was such poor clay and had such limited possibilities; if it had been a better clay, it would have taken much longer because there would have been so much more he could have done with it.

When testing a clay, most people do a few simple texts, although clay bodies can be scientifically tested for more insight. The tests most potters complete are:

Plasticity or workability. Make a coil, wrap it around your finger, pinch it into a ring. Look and see if it cracked, if so it is not very plastic. It may need more water, or it may be short and need more plastic ingredients such as ball clay. Another test is to pinch a small thin bowl and notice its workability.

Shrinkage. Make a long flat piece of clay, say 10 inches long. Let it dry, then measure it, bisque fire and re-measure, fire to glaze temperature, re-measure. Say it shrinks an inch, then you have 10% shrinkage. When you want to make a 4.5" mug, you would have to throw the mug 5" tall.

Porosity. When the clay it fired to glaze temperature, will it still accept water? If so, that clay body is not suitable for food or outdoor sculpture in an area that freezes. To test for porosity, weigh the test piece, immerse the test ceramic in water, let it set, then re-weigh the piece. Did it gain weight? Next, put it in the freezer and see if it cracks or chips?

Color. Fire the clay and visually check the color.

Glaze compatibility. Fire the glaze on the clay body and check for cracks. You can dip the piece in water and see if cracks appear. You can ink the surface of the glaze to check for cracks as well.

Standing strength. When creating a large form, note how the clay supports the weight of the sculpture. If it collapses or cracks, it might not have good stand strength. Grog can be added to compensate, but that reduces its plasticity.

Clay bodies fall into three temperature ranges.

Low-Fire. Cone 010 to cone 1 (1641 – 2109 degrees Fahrenheit)
Earthenware or terra cotta
Raku

Midrange or soft stoneware. Cone 03 to cone 4 (2014 to 2165 degrees Fahrenheit)

High-Fire. Cone 5 to Cone 11 (2200 to 2400 degrees Fahrenheit)
Stoneware
Porcelain

Clay bodies can be categorized by type, but individual bodies have personality and should be tested. As clay bodies have natural ingredients mined from the earth, ingredients can change and affect the clay body, so even if you know a clay body, it can change over time. The following comments are generalizations about particular categories of clay bodies.

Earthenware. Earthenware clay bodies are formed of primarily earthenware clay, the most commonly occurring natural clay. This secondary clay is found in deposits around the world. Made up of decomposed rock, organic materials, and iron, earthenware clays mature at comparatively low temperatures. Most earthenware clay bodies have only a few ingredients:

the earthenware clay, perhaps some ball clay for plasticity, and some grog for tooth or texture. While this clay body matures at low temperatures, its drawback is that it never fully vitrifies, so it is still absorbent after it is glaze fired. If fired hotter than its maturity, the clay will slump and can eventually melt into a puddle.

Most of the pottery and ceramic sculpture created throughout history was made of earthenware. Early pottery was unglazed or glazed with refined clay slip or terra sigillata. These pots functioned well and were thrown away if they started to make people sick from food poisoning. Lead glazes made the pots much less porous, but then the pieces contributed to lead poisoning.

Earthenware clay bodies range in color from the reddish-orange of flower pots to yellow to white, depending on the iron or lime in the clay. This range of color combined with the brilliant colors possible with low-fire glazes makes earthenware clay an excellent choice for potters with an aesthetic love of color. The body's porosity can be utilized. It is more resistant to thermal shock than a tighter, more vitrified body, so it is well suited to baking utensils. Some terra cotta dishes are soaked in water before the food is put inside, when the dish is baked, it releases the water as steam and cooks the food.

Earthenware clay bodies have a smooth, pleasing texture and are pleasant to throw on the wheel. They have a lightness compared to stoneware when glazed fired and are less brittle than many high fired bodies. Earthenware clays add a flavor to food cooked in them. In some countries such as India, that flavor is an essential ingredient in the dish.

Terra cotta is a type of earthenware. It is a red earthenware body to which grog has been added. This gives it a rough texture that is enjoyed by sculptors. This grog also gives the clay more standing strength, so it can make large pieces without cracking or collapsing on itself. Sculptors have traditionally preferred terra cotta for modeling. It can also be successfully used inside press molds.

The ability to make and fire earthenware clay bodies is one of the benchmarks of Neolithic society. Paleolithic hunters and gatherers normally did not make pottery. Once people settled into a more agricultural-based society, pottery was essential to their storage of seeds, food, and water. About 12,000 years ago, the Jomon people of Japan created the oldest known earthenware pottery archaeologists have found to date. Well before 2500 B.C.E., the Egyptians were making earthenware vessels. This clay type remained popular even after the development of high fired bodies. In some parts of the world, such as India and Africa, the tradition of making earthenware pottery for daily use has continued from Neolithic times into

this century. In other areas, such as China, once the materials and technology for firing porcelain and stoneware developed, the earthenware tradition was allowed to languish.

Raku. Raku is a firing process that can be used with a variety of clay bodies, but certain bodies are formulated especially for the raku process. A raku clay body is normally a low firing body that is formulated to withstand the thermal shock of hot removal from the kiln. The process of raku firing was born in Japan in the sixteenth century and used in the service of the tea ceremony. As the tea ceremony celebrates the beauty of the natural and the simple, the clay body needed to have the crude or "natural" qualities of Wabi and Sabi, or rustic, simple beauty. Raku was Americanized or made popular in the Western world in the 1960s by Paul Soldner. His clay body has a good deal of sand in it to withstand the thermal shock. Other contemporary raku artists add kyanite to their clay bodies for their refractory qualities.

Mid-range or Soft Stoneware. This is a compound clay body rather than a naturally occurring one. It fires between cone 03 and cone 4 and is semivitreous and is only slightly less resistant to thermal shock than earthenware. It has a lower shrinkage rate than vitreous traditional stoneware. This body is not very popular but is of interest to potters concerned with the firing costs of stoneware.

High Fire Stoneware. This body fires between cone 5 and cone 11 (2200 to 2400 degrees Fahrenheit.) This clay body is a blend of clays that will vitrify or become non-porous at a specific temperature. It contains some iron, so the body has a variety of earthy colors. A good stoneware body has plasticity, minimum shrinkage, vitrification, little distortion, and earthy color. A stoneware clay body might contain a natural stoneware clay, some fire clay, some ball clay, and some grog for tooth. Sculptors add more grog than throwers, so the body has more standing strength and will shrink less. This grog also opens up the clay body and allows it to dry faster and more evenly. Some artists prefer a lighter clay and will add up to 15% fine-grained organic material such as coffee grounds or sawdust. Be careful to avoid organic material that will spoil or you will have stinky clay. Fiberglass can also be wedged into the clay body to increase its plasticity, as it melts into the body during the firing. Throwers add up to 30% ball clay to add plasticity to the recipe of their stoneware bodies. This body is the most popular for food containers and outdoor sculptures.

Porcelain. Porcelain is a refinement of stoneware and was developed first in China. It is hard, durable, and vitrifies completely at high temperatures. No single clay found in nature will make porcelain, its clay body is composed of three ingredients:
Kaolin
Feldspar

Silica

Most porcelain bodies are white, translucent where thin, and ring sharply when struck. Porcelain is not very plastic, making it a challenge to work with. Ball clay is added to porcelain recipes so they are plastic enough to throw. These throwing bodies can also be called white stoneware.

True porcelain consists of

50 parts clay
25 parts flint
25 parts feldspar

The size or mesh of the flint and type of feldspar can be varied, but the clay to be used is the biggest variable. Ball clay adds plasticity, but grays the body, especially in reduction. Kaolin is white but lacks plasticity. One solution is to use half ball clay and half kaolin. Another approach is to use two kaolins, one more plastic, the other whiter. This type of porcelain has a cream cheese look and a silky feel. To create a porcelain handbuilding body, molochite or porcelain grog can be added.

Soft-paste or bone china is a semivitreous porcelain china using bone ash as a white flux. It is bisque fired to cone 5 and glaze fried lower to prevent deforming.

General Compositions

Stoneware: 25% Ball Clay, 25% China Clay, 35% Flint, 15% China Stone, 0% Bone Ash
Porcelain: 0% Ball Clay, 50% China Clay, 20% Flint, 30% China Stone, 0% Bone Ash
Bone China: 0% Ball Clay, 25% China Clay, 0% Flint, 25% China Stone, 50% Bone Ash
Source: Gladstone Pottery Museum (www2002.stoke.gov.uk/museums/gladstone/)

Processing

Like most natural resources, clay requires processing. After a clay deposit is located, mining takes place. Clay is dug with huge machines and crushed, organic material and contaminants are removed. Some clays are pulverized to points that the particles are so small that they can float on air. The dry clay powder is bagged in heavy paper sacks. The industry has many uses for clay. Manufacturers making moist plastic clay for art use, buy the dry bags of clay, make huge batches of various clay bodies and package them in plastic bags and cardboard boxes. This clay is typically uniformly mixed, compressed to remove air pockets, and has an even distribution of water. These manufactured clays each have their own personalities. Some artists buy the dry clay powder and make their own clay from their preferred recipes.

Plastic Clay to Ceramic

When clay is wet or plastic is has a remarkable ability to move into a position the artist desires and to stay there. Clay platelets are long, thin discs. The water in between them acts as a lubricant, making the clay flexible. When the water dries, the platelets stay in place but are no longer flexible. When the clay is fired the platelets grow crystals that interlock the separate pieces turning the clay into ceramic.

Firing

Firing is a transformation process in which heat turns clay into ceramic. Scientifically, this metamorphosis is based on changes that take place in the crystalline structure of the quartz in the silica at high temperatures.

Once transformed by firing, the change from clay to ceramic is irreversible. Bisque or high fire ceramic can never be turned back into plastic clay. It can be ground into grog and used as temper or tooth in a clay body, but the grog itself is not pliable clay.

Shaping a lump of soft plastic clay into a vessel or sculpture, then firing it into a state of permanence is an awesome act of creation. Firing seems a magical act of transformation that results in an artifact that will exist for thousands of years. It will remain as a trace of your existence, so shape and fire it with thought and care.

Firing is the final element in a long sequence of activities that result in the creation of a ceramic object.
Choosing and preparing the **clay**
Forming the object that communicates your **concept**
Choosing and applying the **surface**
Choosing the type of **kiln**
Firing the kiln

As such an important aspect of the ceramic process, firing requires understanding, practice and careful attention.

Bisque Firing

Although some pieces are once fired, most pieces of ceramic are fired twice. The first firing is called the bisque. This firing is hot enough to sufficiently harden the body, but still leave it absorbent for easy glaze application. The majority of potters fire bisque above cone 010 and below 04. We fire at cone 08 as most glaze applications, including raku, work well with this range. If you use some commercial glazes they may call for a higher bisque firing, so be sure to read directions. Some pit or saggar fired pieces work better with a lower bisque, so they are more susceptible to the effects of smoke and salt fuming.

Drying. Before bisque firing, the piece should be completely dry. Drying is a crucial part of the ceramic process. If a piece is dried too quickly, it will probably dry evenly causing cracks and warping. Never completely dry a piece in front of a fan, as that is directional and will certainly warp, even crack your piece. Drying time depends on the size of your piece and how many seams it has. For best results, dry a large (15") sculptural piece under plastic for a week, changing the plastic each day to remove any moisture that accumulates on it. Do not let water from the plastic run onto your piece. Next, let the piece sit in the air without the plastic for a few hours each day. That will remove some moisture, when it is rewrapped, the moisture will even out. Once the piece has developed some dry areas, usually after about a week, you can let it sit in the air and dry. Avoid breezes. If that is not possible, make a paper tent and wrap it around your piece to protect it from wind, but still allowing it to dehydrate.

For pots, after a piece is thrown it can be sat in front of a fan until it is leatherhard. It needs to be rotated often, say every 10 or 15 minutes to have even dryness. The best practice is to let the piece slowly dry to leatherhard in the air. In most climates that is overnight. The next day, the potter would trim the piece and sit it in the drying box to dehydrate. In a school setting, it is not always possible to work two days in a row. A good practice is to throw, dry the piece to leatherhard in front of the fan, remove it from the bat and place it on a plaster bat or small ware board. Wrap the pot and bat in a plastic bag and set it in a damp box. When you can trim, unwrap the bag and check the clay for firmness. If it is leatherhard, trim. If not, dry it in front of the fan for a few minutes. Once trimmed it can be air-dried. If the pot has attachments, wrap it in a bag for at least a day or two before drying the piece. Handles can be waxed or wrapped in plastic if they are so thin you fear they will dry more quickly than the body and develop a crack.

Large pieces can be dried in the kiln if you have unlimited kiln time and space. Large sculptures are easier to load into a kiln when they are firm leatherhard. They may be extremely delicate to load as greenware if they are large and unwieldy. Be sure to put a layer of grog on the floor of the kiln or on the kiln shelf to aid the piece in moving while shrinking during air drying. Use the kiln as a big damp box. Wrap the piece in plastic for a few days, then remove the plastic,

but keep the door closed. When the piece feels dry, open the door and turn the kiln on, but keep it below the boiling point of water, say 200 degrees Fahrenheit and begin to dehydrate the work. After a couple of days of drying, the piece should be ready to slowly bisque fire. Remember for each ½ of thickness the kiln should fire a full day. The bigger the piece, the slower the firing.

Glazed greenware can be once fired. This saves fuel and labor, but has several drawbacks:
Greenware is very delicate and can easily break while glazing. Test your clay body for dry strength. Do not use tongs for dipping. Do not hold by handles or rims. Spraying glaze is the safest application method.
Some clays, especially stoneware release gases during the firing that can affect some glazes. This gas release may cause bubbles in the glaze or crazing. Experiment with your glazes to see if they can once fire.
There is a greater chance of a blow-up resulting in messy glazed shards ruining other pieces and the kiln.
Bisque fired pieces tend to have brighter colors than their single-fired counterparts.

Procedure for Bisque Firing

Install the proper cone into the cone setter. Cone 08 is most typical. You could also install a large visual cone if so desired.
Set the timer to the maximum. It will need to be reset after the dehydration as they run out after 20 hours.
Check to make sure your kiln shelves are clean, free of glaze drips, and have a complete application of kiln wash.
Choose the pieces for the bottom level. Put in the proper stilts. If the stilts are over 8 inches, you may want to use fire brick for the stilts.
Load the pieces. If the pieces are small or similar in design, they can be stacked inside each other. Pieces can touch each other and the stilts but should be kept at least an inch away from the kiln elements. There should be some room over the top of the piece to allow for expansion.
Put one element on low and prop the lid open at least several inches. Unplug the peepholes.
Allow the kiln to dehydrate under the boiling point of water for at least **12 hours**, longer for thicker or larger pieces, or if the kiln is densely packed.
Check the temperature of the kiln after 30 minutes to an hour to make sure it is staying under the boiling point. If it is getting too hot or an element is glowing red hot, turn the kiln off or contact the teacher.
Reset the timer. Make sure the kiln light is on indicating that the kiln is on.
Turn all elements to **low** for at least an hour.

Turn all elements to **medium** for at least an hour.
Turn all elements to **high** for at least an hour.
Shut the lid and plug the peepholes and watch the kiln as it rises.
Be sure to **watch the pyrometer or large visual cones** as a double check on the Dawson cone sitter. Turn the kiln off if it doesn't turn off automatically.
Check to make sure the kiln is cooling. If not, turn the power off at the breaker and inform the teacher.
Let the kiln cool slowly for at least 12 hours.
Prop the lid open if the kiln is under 400 degrees. Make sure all the elements switches are in the off position.
Unload when the pots are cool enough to remove without gloves. If unloading when the kiln is warm, be sure to wear protective gloves.

Most potters prefer to bisque fire in an electric kiln because they are easier to regulate at low temperatures. It is possible to bisque fire in some gas kilns. To do so, keep the kiln in an oxidizing atmosphere. The first 600 degrees are critical. Physical or free water is released in the form of water vapor. If the heat rise is too rapid, the piece explodes as steam tries to escape. Grog, temper, or tooth allows for steam and gases to escape. Thick-walled pieces should contain 20 to 30 percent tooth – grog or fire clay.

Gas Bisque Procedures in a non-computerized kiln

Leave the kiln door propped open one or two inches. Leave the damper open 2 or 3 inches.
Place the cones so you can see them in the peepholes.
Turn the **pilot light on**. Leave for at least 12 hours for thin work longer for thick or large work.
Stay under 200 degrees – do not go over the boiling point of water. Shut the door to even out the heat, but stay under the boiling point.
Open the door again. Barely crack open the gas valve. Hit the reset button and start the kiln.
You should hear the main burners light. Check to see that they have a good flame. Set the air on low about 5 to 10. The damper is still at 2 or 3 inches.
Try to keep **the heat rise under 100 degrees an hour.**
If the heat rise is too slow, increase the gas a little to .125, then .25 and .5.
Once the kiln has reached 600 near the pieces, shut the door.
Gradually increase the gas pressure watching the heat rise. Don't go over 2.0. You can also gradually increase the airspeed of the blowers. Don't go over 20.
When cone 08 falls on the bottom, shut the kiln off, turn the gas off, plug the peepholes, turn the air off.
Allow the kiln to cool slowly. Unload when the piece can be handled without gloves.

Bisque temperature should be judged with a cone. **Cones** are composed of clay and glaze materials and are formulated to melt at a specific work/heat. **Work/heat involves time and temperature**. It is similar to the toothpick test when baking a cake. Doneness is a result of staying at a certain temperature for a certain duration of time.

Pyrometers measure the **temperature** inside a kiln and are helpful in firing, especially **to judge heat rise**. They shouldn't be used as the sole determinant in deciding if bisque or glaze work/heat has been reached. Pyrometers in a gas kiln should be protected with a clay tube, protecting the wire from the corrosion of reduction. Pyrometers are delicate and should be handled with great care.

Quartz Inversion

As the kiln heats up, the physical water is released and the silica in the clay gradually expands. Between 450 and 1070 degrees **quartz inversion**, a series of expansions and rapid changes in the **crystalline structure** in the quartz takes place. If fired too quickly at this point, the bisque piece may be cracked. At **1063 degrees, quartz inversion takes place** and the quartz crystals change from **alpha to beta quartz**, while a slight expansion takes place. The chemically bonded water will leave the piece between 950 and 1300 degrees, causing considerable shrinkage, this is called **water smoking**.

At 1850 degrees, mullite begins to form. **Mullite** has tough interlocking crystals composed of alumina and silica. This chemical combination gives the fired body its strength. Mullite is not fully developed until stoneware temperatures are met. As the temperature increases, free silica forms glass around the mullite. Because of impurities and clay body variations, especially iron, clay bodies achieve maximum hardness at different temperatures.

Earthenware 2000 degrees
Stoneware 2350 degrees
Porcelain 2350 degrees
Kaolin 3200 degrees

The term **maturity** refers to the top temperature a clay body can be fired to before it begins to slump and melt. When fired to maturity, some clay bodies are vitrified and impermeable to moisture. Earthenware never fully vitrifies. Stoneware and porcelain vitrify around cone 10.

Most potters fire their bisque to somewhere around 1850, so the mullite makes the body hard enough to handle while glazing.

Glaze Firing in an Electric Kiln

Glaze firing in an electric kiln with dry pieces can be done **faster** than bisque firing.
Turn one element on low and prop the lid open for one hour to ensure the **glazes are dry**.
Turn **all elements to high**, plug the peepholes, close the lid, and fire.
Be sure to watch the kiln to see that **it turns off**.
Cool until the pieces are cool enough to the touch or at least under 400 degrees. Some glazes must stay in the kiln until they are room temperature to avoid cracking.

Glaze Firing in a (Alpine Updraft) Gas Kiln (non-computerized)

Pilots

Start the firing log by recording the type of firing, date, your name, and the number you can be reached if there is a kiln question or problem.
Open the damper to 2 inches.
The door should be closed but not locked.
Put in cones 012, 7, 9, 10 –at the top and 04, 7, 9, 10 bottom peepholes.
Turn the **pilot gas valve** on by turning it to the left. It is the smaller of the two handles.
Flip the toggle switch into the on position.
When the red indicating light comes on, use a torch and light the left pilot, then the right.
Leave the pilots on to warm up the kiln for at least an hour.

Main Gas Burners

Open the large gas valve a little – one turn to the left,
Hit the reset button on the computer's high limit controller. You should hear the main gas valves light. Visually check to see if they are on.
Shut the door and screw it locked.
Turn the gas up to .25, the air on 5, and the damper at 2. Leave at this setting for several hours.
At midnight, turn the gas to 1.25, air on 20, and damper left at 2 for 8 hours.
At 7:30 am check the kiln. If **cone 012 has gone down put it into reduction,** if not increase the gas to 4, air to 45 and watch for cone 012 to go down on top.
To set reduction at 012, increase the gas to 6, the air to 100, and move the damper in until you have flame coming out the top peephole and the bottom peephole is not sucking.

Watch the kiln until cone 04 goes down on the bottom, then leave it for another hour in reduction. There should be a flame out the bottom peephole.
Put **the kiln in neutral**, the bottom peephole is not sucking, but the flame is not coming out either. Leave the gas on 6 and air on 100, but pull the damper out a little. Oxidation will cause the top temperature to rise rapidly.
Leave in neutral or oxidation until **cone 7 falls** on the top. Put it back in reduction.
Watch until cone 7 goes down on the bottom, leave it for one hour in reduction.
Open the damper a little if more heat rise is needed, watch carefully, trying to keep the top and bottom as close in temperature as possible. Check with a portable pyrometer to judge evenness.

When the **cone10 melts and bends** on the top, open the damper a little more to clear the atmosphere for a few minutes.
Turn the kiln off at the toggle switch
Turn off the gas valve
Turn off the pilot valve
Turn off the air
Shut the damper
Plug the peepholes

21. Let the kiln cool slowly to 700 degrees, then crack the door open and let it continue to cool to 400 degrees, crack the door open more to cool completely. Unload when at room temperature.

Cooling

Cooling is the final step of firing. After reaching temperature, the kiln should shut off or be shut off. If allowed to cool naturally and slowly, with the peepholes plugged and the lid closed, the ware will cool slowly and color will develop in the glazes. If cooled too quickly, the ware, the kiln, and the kiln furniture can develop cracks. The kiln should not be opened until it is under 400 degrees by the pyrometer. Then the door can be propped open and the peepholes unplugged. The best practice is to allow the pieces to cool so they can be unloaded with bare hands, but if the kiln is in demand, it can be unloaded around 400 degrees. If unloading hot pots be sure to wear protective gloves and long sleeves.

Do not leave the kiln unattended. Do not leave the lab during the last part of the firing as subtle adjustments need to be made in the final stages of firing. Firing is the last critical step in the ceramic process, take it seriously.

Glazing and Surface Decoration

A great work of ceramic art has three components:
A significant, novel, or important concept or **idea.**
A **form** crafted with skill and creativity.
A **surface** that enhances the idea and the form.

In the wet or leatherhard stage, clay can be surfaced in a variety of ways. Some of these are:
Impressing textures such as lace, burlap, curtains, leaves, wheat, cardboard, net, flowers, etc.
Incising. Lines can be drawn into the clay with a pencil or needle tool. Dragging the tool rather than using its sharp tip creates a smoother line over one that has burrs.
Scraping. If the clay has tooth, a metal scraper can be drawn over the surface of the leatherhard clay and the grog will pull lines across the piece in the direction of the pull.
Burnishing. The metal rib or any hard polished surface such as a spoon or polished rock can be pulled over the surface of the clay in such a way as to compress and align the particles creating a reflective surface.
Stamping. Pressing the clay with any firm porous surface such as wood, bisque, or plaster shapes will create an impression in the clay but easily release. If the clay is firm enough, metal, stone, and rubber stamps can be used.
Carving. To make a shallow three-dimensional relief on the surface, draw a line, then carve away on one side of the line. Undercuts make a dark shadow and create a dramatic effect.
Add Clay Coils. Clay coils the same firmness as the surface of the form can be slipped, scored, and blended onto the surface of the piece.
Slip Decoration. Slip or liquid clay can be trailed, inlaid, or brushed onto the surface of leatherhard clay. It may crack due to more rapid shrinkage than the base. That can be countered with a slip recipe that shrinks less.
Sgraffito. Scratch through one layer or color of slip to reveal the color below
Stencils. Coat the surface with slip. Add a stencil. Coat with another color of slip and when dry enough, remove the paper stencil to reveal the first color.
Mishima. Incise a line, brush in a colored clay slip, scrape to remove the excess, and reveal the colored line.

Greenware or dry unfired clay can be decorated with engobes, slips, terra sigillata, or underglazes. Special care must be taken not to break the delicate Greenware.

Bisque. Once a piece is dry, fire it hot enough to harden the body, but not to vitrify it. The reason for bisque firing is to harden the body sufficiently so it can be handled during the glazing process. It needs to be porous to accept the water in the glaze that allows the glaze to stick to the piece. Bisque is normally fired between cone 010 and 04. We bisque fire our pieces to cone 08.

Clean. Before glazing, make sure your piece is clean and free of dust. It can be showered off, wiped off or blown off with the air gun. Try not to leave bits of paper or cloth on the piece. Be sure not to touch the bisque with greasy hands or hand cream as that will act as a resist. Remember oil and water do not mix. If rinsed off, it must be allowed to dry before glazing. If the piece is saturated with water, it will not be absorbent enough to accept the glaze water.

Dry Foot. In the glaze firing, the base of the piece must be free of glaze. This is called dry footing and can be accomplished in two ways.
Glaze the piece, then sponge the glaze off the bottom of the piece. If the glaze is runny or the piece is vertical, wipe off some of the glaze on the sides near the bottom of the piece. A quarter on an inch is usually enough.
After the piece is cleaned and dried, coat the bottom and side with wax. Allow drying. Glaze. Wipe the glaze off the wax. Some wax will be left, but it will burn off in the kiln. Burning wax can cause some glazes to bubble and pit, so experiment with your glazes before using wax extensively. Burning wax produces gas, so be sure your kiln is ventilated to remove harmful gases.
To dry foot means the bottom of your piece is **free of glaze** when it enters the kiln.

Glaze. Choose glazes that melt at the **same temperature or cone**. Be sure your kiln can fire to that cone. **Cones are made of clay and glaze materials and are formulated to melt at a specific work/heat. Cones measure time and temperature effects on clay and glaze.** When you start an electric kiln, you will probably need to install a cone into the cone sitter. You can also use large visual cones in front of the peepholes as a double check to see if your glaze is mature. Cone 04 to cone 06 are the most common cones to fire low fire glazes. Cone 9 or 10 are the most common stoneware glaze cones.

Check to see what **atmosphere** the glaze calls for and check to see if your kiln can fire in that atmosphere. There are two atmospheres:
Oxidation or Neutral. Firing with a clean heat or flame. There is plenty of oxygen to burn up the fuel efficiently. This can be easily done in an electric kiln or a gas firing.

Reduction. Firing with insufficient oxygen to burn up the fuel. This creates an oxygen starved atmosphere that pulls oxygen away from clay and glaze materials changing their color. This can not be done in an electric kiln without damage to the exposed elements.

Prepare the Glaze. Mix the glaze ingredients so that all the chemicals are evenly suspended in the water. Most chemicals are insoluble in water, so they sink like a rock to the bottom of the bucket. A few glazes contain soda that is soluble like salt so they float in the water. So it is important to mix all ingredients including the water into an even mixture and glaze while it is suspended. Some glazes have chemicals in them that are solid while at rest, but liquefy when in motion, so be sure to mix the glaze before adding water.

Apply the Glaze. There are four basic methods of applying glaze:

Dipping. If the glaze bucket is several inches larger than your piece, you can quickly dip the piece in the glaze and shake it over the bucket to remove excess glaze. You can dip all or sections of the piece. This works well for simple forms such as thrown bowls, plates, and mugs. Most glazes are formulated to be thick enough to only need one dipping. The glaze coat should be about 1/32 to 1/16 inch thick, about the thickness of a fingernail. Thicker glazes may run and thinner glazes usually turn brown.

Brushing. Some glazes can be brushed on with a soft bristle brush. Most glazes call for three flowing coats. Normally brushing is done on low fire glazes. Many high fire glazes are so sensitive to thickness that brushing leaves unsightly textures. Often the brush will remove glaze rather than leaving glaze behind. Experimentation is needed to see if a glaze is brushable.

Pouring. Pouring works much like dipping, only you can direct the flow of glaze to one area and make shapes. It is normally not as even a coat as dipping.

Spraying. Most glazes can be sprayed through an air gun. Prepare the glaze to make sure it is thin enough to go through the gun's nozzle. If it won't, try adding water or running the glaze through a strainer to remove any large particles. Set the piece on a clean paper on the turntable. Put on a dust mask. Shut the door to the glaze room. Turn on the air compressor. Turn on the exhaust fan. Point the nozzle towards the piece facing the back of the booth. Stay about 6 inches away from the piece. Spray thin coats on the form until you have built up that 1/32 to 1/16 inch thick skin. Spraying glaze is much like using a can of spray paint. Move it around so it doesn't get too wet in one spot, or it will run. After spraying, clean the gun by running water through the nozzle. Pour the excess glaze back into its bucket. Clean up your paper in the booth. Turn off the air and fan.

Be sure to keep a **record** of all the glaze treatments you gave a piece. The best practice is to draw a quick sketch of the form and note which glazes you used and in what order, where the

piece was located in the kiln, and how the kiln was fired. If the surface was successful you can repeat that success, it not you can avoid making the same mistake twice.

There are many variations to the glaze applications listed above.
Paint **underglazes** on first, then glaze. The underglazes may show through or affect the color of the upper glazes.
Layer glazes. Where two glazes overlap you will get a new glaze. Layering glazes is like painting with transparent layers of molten glass. If you get it on too thick it can be runny. You can spray glazes on top of dipped or poured undercoats. You can brush glaze patterns on top as well.
Add **overglazes** after the glaze coating for added shapes and textures.
Use **stencils** between glaze layers
Use wax as a resist. Wax can be painted on the bisque or on top of another glaze before the next coat of glaze is added. The glaze can be removed from the wax or allowed to stay and create a speckled effect.
Sgraffito or scratching can be done through glazes to reveal another color of clay or glaze under the topcoat.

If too many coats or too thick a layer of glaze is applied to a bisque form, the glaze will begin to crack and peel off. If this happens, it is best to wash the glaze off, let the piece dry at least overnight and glaze it another day. If a too thick glaze is fired, it may peel off in the kiln ruining the piece, its neighbors, and the kiln shelf. If you try to glaze the piece right after it has been washed clean, it will still be full of water and not accept the glaze water.

Dry foot. Before you load your glazed piece in the kiln or sit it on the shelf to be glaze fired, check to see that no glaze is on the bottom of the piece. Even glaze on the wax will stick your piece to the kiln wash and may ruin your piece. If the glaze is runny, it should be dry footed up the side at least ¼ inch.

Loading. Carefully load your dry glazed piece in the correct kiln for its required cone and atmosphere. If needed put in kiln shelves coated with kiln wash to protect your piece from sticking to the shelf in case of a mishap. **Kiln wash** is a mixture of equal parts by volume of **Kaolin and Flint** mixed with water to the consistency of paint. These ingredients will coat the shelves with a protective layer of clay and glaze that will not melt at the temperature we glaze fire. If a glaze does run and attaches to the kiln wash, it normally can be ground off. The piece may not touch any part of the kiln except where it is dry footed. The piece may not touch another piece or any kiln stilts. The piece should have room over its head for a little bit of expansion.

Firing. Glaze color is affected by several variables in the firing as well as your choice of colors and glaze application. Those variables include:
Atmosphere – oxidation or reduction. When and how heavy the reduction atmosphere is allowed dramatically changes the color and textures of glazes and clay.
Temperature. The top of the kiln is generally hotter than the bottom. How hot your piece gets and for long it stays at that high heat has a big impact on the glaze.
The neighboring pieces' fuming. Some glazes release colorants in the firing and can subtly change the colors of the piece sitting close to them.
How the kiln is fired can be an important element in the success of your glazed surface. To truly complete your own work, you need to learn to fire the kiln. Get involved. Load your own pieces. Fire the kiln. Take careful notes about glazing, kiln placement, and firing in order to learn the entire ceramic process.

It may help to understand a little of the chemistry behind glazing.

Clay is composed of:
Silica
Alumina
Water

Glaze is composed of:
Silica
Alumina
Flux

In addition, glaze ingredients called **colorants** may be added to give the glaze color and texture. **Water** is added to the dry mixture to make it easier to apply the glaze to the dry or bisque fired piece. The water has no chemical importance to the glaze, in fact, the earliest glazes were dry ingredients sprinkled onto the shoulder and the inside bottom of the vessel.

In a glaze, the silica acts as a glass former. Silica is found in flint or quartz melts into a glass at a high temperature, around 3100 degrees Fahrenheit. That is higher than we can fire the kiln. In order to lower the melting temperature of the glass or silica, a flux is needed. Flux is a chemical compound, often found in nature that melts into a glass at a lower temperature. Whiting, barium carbonate, and dolomite are commonly used fluxes. Alumina provides the refractory quality needed in a glaze. Alumina adds strength to the glass. If the percentage of alumina gets to a certain level in a glaze, the glass will become opaque or matte.

To mix a glaze, wear your dust mask. Check to make sure you have all the ingredients. Choose a container big enough for your batch. A rule of thumb is that 100 grams equals about a cup of glaze and 1000 grams equals a gallon. Measure the glaze ingredients carefully in their dry powdered state, normally by weight, not volume. The dry ingredients are blended thoroughly. Look at the volume of glaze and measure out half that volume in water in a similar-sized container. Add the dry powder to the water. Let it soak in. Mix the glaze. Run the glaze through a screen. Label the glaze container with the recipe and cone it should be fired to. Store with a lid on the container to avoid the water dehydrating. Clean up the glaze mixing area and sink.

There are **descriptive words** for glaze surfaces.
Gloss is the word for glazes that are smooth, glassy, and often transparent.
Matte glazes are opaque, drier.
Satin glazes are semi-matte and smooth, but opaque.

Some glazes have long histories, especially the cone ten reduction glazes.

Celadon is one of the first true glazes discovered. The Chinese fired to high temperatures in wood-burning kilns. They observed a runny glass-like coating on their pots where the wood ash had settled and ran. They further developed this discovery by sifting the wood ash onto the shoulders of the pot. The wood ash and clay combined to create a transparent greenish glaze that is still being experimented with and used by potters all over the world. Celadon glazes are glossy, transparent, normally an earthy green, and very durable. Many potters love them over carved or slip decorated ware.

Temmoku, Tien mu, Tenmoku, or Blackware. Called by a variety of names, this black glossy glaze is not very transparent when thick. It is made up of a low fluxing clay-bearing iron. There are variations of blackware:
Oil Spot Matte Metallic. Crystals form in the glaze.
Teadust Black. This glaze can be fired cool enough to be green. Crystals of green develop in the black base. If fired hotter the black dominates.
Hare's Fur. Long crystals like a rabbit's fur develop in the black for a beautifully textured look.

Clear or Liner Glazes. Clear glass that is totally transparent has been used over stoneware with slip decoration or with overglazes for durability and long service. Over porcelain, it is prized for a pure white effect.

Copper Red. A bright red glaze with a dramatic impact, it was normally used for imperial or special ceramics. It is often given romantic names such as peach blossom or ox's blood.

Kaki or Iron Red. Easier to achieve and more dependable, red glazes can be achieved with iron as the colorant. Iron reds are a little less flashy. The more iron used, the more metallic the glaze appears.

Chun or Jun Glazes. These glazes appear blue or purple but are in fact not colored with colorants. Spheres or bubbles in the thick transparent glaze reflect light in a similar manner as the water in our sky makes our atmosphere appear blue. These glazes were developed and prized by the Chinese and given names such as Clair de Lune by French collectors.

Shino. The shino family of glazes has the ingredient of soda in their recipes. As soda is soluble in water, it is very susceptible to variations in water. It will even change color if left out in the air while drying before firing for long periods of time. Most shinos are white when fired in oxidation and a burnt orange when fired in reduction. They pit, crawl and roll, but these glaze defects are highly prized by shino potters and their collectors for their uniqueness and earthy appeal.

Cobalt Blue. A clear glaze with cobalt as a blue colorant, this glaze is durable and can have a depth of rich blue color.

Cone 10 Reduction Glazes

Pete's Clear 10

25	Custer Feldspar
35	Flint
20	Whiting
20	Grolleg Kaolin

Waxy Matt 10

414	Custer Feldspar
218	Flint
103	Georgia Kaolin
98	Dolomite
121	Talc
46	Gerstley Borate

Oatmeal 10

336	Custer Feldspar
98	Whiting
84	Barium Carbonate

76	EPK	Kaolin
26	Flint	
49.4	Rutile	
12.4	Red Iron Oxide	

ROB – Red Orange Blue 10

672	Talc
1230	Whiting
1932	Custer Feldspar
996	Georgia Kaolin
1200	Flint
300	Rutile
120	Bentonite

Stoney Blue Matt 10

337	NC4 Soda Feldspar
251	Georgia Kaolin
171	Dolomite
106	Talc
70	Spodumene
45	Whiting
20	Bentonite
9	Cobalt Carbonate
3	Red Iron Oxide

Salt Blue 10

20	Slip Clay (Alberta)
5	Whiting
15	Gerstley Borate
60	Custer Feldspar
2	Cobalt Carbonate

Blue Ash 10

970	Slip Glaze (Alberta)
364	Ball Clay
606	Whiting
30	Cobalt Carbonate
26	Red Iron Oxide

Temmoku 10

10	EPK
20	Whiting
35	Flint
35	Custer Feldspar
10	Red Iron Oxide

Black Engobe 10

50	Soda Ash
50	Whiting
100	Nepheline Syenite

150	Custer Feldspar
200	Georgia Kaolin
200	Ball Clay
250	Flint
100	6600 Black Mason Stain

White Ball Crawl 10

50	Magnesium Carbonate
50	Nepheline Syenite

Kaki 10

10	Bone Ash
7	Talc
8	Whiting
47	Custer Feldspar
7	EPK
21	Flint
11	Red Iron Oxide

Cranberry Red 10

738	Custer Feldspar
102	Gerstley Borate
111	Whiting
49	Flint
3	Copper Carbonate
10	Tin Oxide

Sprague's Copper Matt Green10

27	Barium Carbonate
4	Dolomite
50	Custer Feldspar
9.5	Georgia Kaolin
9.5	Flint
4	Copper Carbonate

Celadon 10

20	Flint
70	Cornwall Stone Clay
20	Whiting
10	Georgia Kaolin
2.5	Red Iron Oxide
2	Bentonite

Reeve's Overglaze Green 10

75	Custer Feldspar
15	Whiting
5	Flint
5	EPK
4	Chromium Oxide
2	Bentonite

Woo Yellow

33	F4 Feldspar
25	Barium Carbonate
12	Dolomite
7	EPK
7	Flint
15	Zircopax
3	Red Iron Oxide
1	Gerstley Borate
1	Soda Ash