# Auburn University

Syllabus

1. Course Number: CTSE 4970 or CTSE 7970

Course Title: The Science in Crafts

Course Credits: 3 Semester Hours

Prerequisites: None

Corequisites: None

2. Term: Spring 2022

Day/Time: Tuesdays 6:00 – 8:50 pm

Instructor: Dr. Christine Schnittka

Office Address: 5072 Haley Center

Contact Information: Schnittka@auburn.edu or (334) 844-8277

Office Hours: Monday 1-3 pm and Tuesday 2-4 pm and by appointment

3. Texts: Readings will be provided through Canvas from texts such as:

*The Craft Reader* edited by Glenn Adamson

*Craeft* by Alexander Langlands

*Craft: An American History* by Glenn Adamson

*Thinking Through Craft* by Glenn Adamson

*The Invention of Craft* by Glenn Adamson

*A Theory of Craft* by Howard Risatti

*Why We Make Things and Why it* Matters by Peter Korn

*European Hand Papermaking: Traditions, Tools, and Techniques* by Timothy D. Barrett

*The Golden Thread: How Fabric Changed History* by Kassia St. Clair

*From Mud to Music* by Barry Hall

*Japanese Papermaking* by Timothy Barrett

The required text is: *Handmade: A Scientist’s Search for Meaning through Making*, by Anna Ploszajski.

4. Course Description

This course will introduce education, engineering, art, and science students to the intersection of traditional crafts and scientific and engineering knowledge. It will give students the opportunity to explore traditional crafts such as papermaking, weaving, pottery, and soapmaking. Students will interact with professionals in these fields, work on developing curricula for K-12 students to use in maker spaces and classrooms and learn the underlying science and engineering that makes these crafts work. Students will experience, evaluate, and design interdisciplinary curricula to be used within K-12 classrooms to promote STEM knowledge, practices and beyond.

5. Course Objectives

This course examines theoretical and practical perspectives about how crafts are a form of engineering imbued with scientific knowledge and practices. Students will spend the semester learning the skills in traditional crafts, the science and engineering embedded in these practices, and examining existing curricula and standards in science and other disciplines to identify where and how crafts can be used to teach science and engineering. They will critically reflect on readings and on presentations by guest speakers. They will learn to examine education with a different lens- one that centers on using one’s hands to construct knowledge.

## 6. Course Content Outline

|  |  |  |  |
| --- | --- | --- | --- |
| **Module #** | **Date** | **In Class** | **At Home** |
| **1** | 1-18 | Introduce course goals and projectsExcerpts from [Craft in America](https://www.pbs.org/craft-in-america/)Ceramics workshopExcerpts from [Making Science/Crafting Theory](https://biccs.dh.gu.se/2021/03/1) | Read syllabus |
| **1** | 1-25 | Science and engineering of ceramics: material properties, firing thermodynamics, 3D printing with clay, spatial thinkingIndigenous ceramicsMud and musicGuest: A potter | [Institute of Technology, Boston, 1861](https://archive.org/details/objectsplanofins00mass/mode/2up)[Finally, the Bowl Gets Its Due](https://www.nytimes.com/2013/03/28/garden/finally-the-bowl-gets-its-due.html?pagewanted=all)[The Art and Craft of Science](https://www.ascd.org/el/articles/the-art-and-craft-of-science)[Clay 3D Printing](https://journals.oslomet.no/index.php/formakademisk/article/view/4200/3813)*Craft: An American History*, Ch. 1C*raeft*, Chapter 12*From Mud to Music*, Chapter 4[Nicaraguan Black Pottery](https://youtu.be/aX7Uy2xv4uM)*Why We Make Things and Why it Matters*, Chapter 1-3Craft Autobiography |
| **2** | 2-1 | Textiles workshop: designing a loom, programming the weftJacquard loomsLatin-America Indigenous weaving examplesCentral-Asian rug examplesSewing for social justiceGuest: A weaver | [The Distinction between Art and Craft](https://www.jstor.org/stable/3333159)[Biobricks and Crocheted Coral](https://www.cambridge.org/core/journals/science-in-context/article/abs/biobricks-and-crocheted-coral-dispatches-from-the-life-sciences-in-the-age-of-fabrication/F366920B3DB51A6AB0496AA0D1117778)*Craeft*, Chapter 7Busy Hands, Busy Brains |
| **2** | 2-8 | Science and engineering of textiles: analyzing patterns and structures generated by weaving, algorithms of weaving, material properties.Psychological benefits of crafting.Trying other crafts from instructions | [How Craft is Good for our Health](https://theconversation.com/how-craft-is-good-for-our-health-98755)*Golden Thread*, Chapters 1&2Craft instructions |
| **3** | 2-15 | Papermaking workshop: processing raw fibers, mixing and blending fibers, evaluating paper products.Guest: A papermaker |  [Shop class as Soulcraft](https://www.thenewatlantis.com/publications/shop-class-as-soulcraft)*Craeft*, Chapters 1-3*Japanese Papermaking*, Ch 1-3 |
| **3** | 2-22 | Papermaking science and engineering, history and culture: Chemistry of paper, biology of paper, paper in nature | [Technology as Skills](https://www.jstor.org/stable/3101931)*European Hand Papermaking*, Chapter 1[Japanese-Style Papermaking](https://youtu.be/uRA7p3Y70Po) |
| **4** | 3-1 | Bread, butter, cheese and kombucha workshop: making and eatingHistory of CheeseGuest: A professional chef | [Culture, History, Biology, and Body](https://anthrosource.onlinelibrary.wiley.com/doi/abs/10.1525/eth.1999.27.3.379)[Paxson, 2011](https://anthropology.mit.edu/sites/default/files/documents/paxson_art_and_science_of_cheese.pdf)[Fundamentals of Cheese Science](https://www.researchgate.net/profile/Atef-Abou-El-Nour/publication/286119901_CHEESES_Processed_Cheese/links/60e2e4eca6fdccb74506d072/CHEESES-Processed-Cheese.pdf) |
|  | 3-8 | Spring Break |  |
| **4** | 3-15 | Bread, butter, cheese and kombucha science and engineering: microbes, symbiotic cultures, milk chemistry, manufacturing techniquesBread and cheese from around the world- a feast! | [How the arts can help you to craft a successful research career](https://www.nature.com/articles/d41586-021-00334-2)*Culinary Reactions*, Chapter 9*The Science of Cheese*, Chapters 1 & 2 |
| **5** | 3-22 | Soap workshop: Make and wash, test and evaluate[Sloyd Eduation](https://etselts.ee/wp-content/uploads/2016/09/lofu_nr2-3_2006.pdf#page=34)Guest: A soap maker | [The Work in the Classroom for Sloyd](https://etselts.ee/wp-content/uploads/2016/09/lofu_nr2-3_2006.pdf#page=152)[Who Wrote the Book of Sloyd?](https://www.pbs.org/video/who-wrote-the-book-of-sloyd-fggvvq/)[The Slojd Tradition](https://youtu.be/jNatD_l_6PA) |
| **5** | 3-29 | Soap science and workshop: Chemistry of soap, dirt and grime, and history/cultureCrafts in schools: Various examples from around the world3D Printing as craft+science | [Learning everyday technologies through playful experimenting](https://journals.oslomet.no/index.php/formakademisk/article/view/4198/3820)[A Primer on 3D Printing](https://www.ted.com/talks/lisa_harouni_a_primer_on_3d_printing)[Learn to Endure](https://journals.oslomet.no/index.php/techneA/article/view/4218) |
| **6** | 4-5 | Candle workshop: A variety of methods and materials from rolling, dipping, and pouring- from bees to coconutEssential oils in cultures around the worldGuest: A candlemaker | [Soy Candlemaking and Design](https://www.worldscientific.com/doi/abs/10.1142/9789811228001_0162)[Indigenous Lesser-known Essential Oils](https://www.researchgate.net/publication/305655917_Indigenous_Lesser-known_Essential_Oils_-_A_Perspective) |
| **6** | 4-12 | Candle science and engineering: Chemistry, heat transfer, combustion[Craft Research](https://www.intellectbooks.com/craft-research) | [The Chemical History of a Candle](https://www.ias.ac.in/article/fulltext/reso/007/03/0090-0098) |
| **7** | 4-19 | Natural dyes workshop: Indigo as a biomolecule, ancient craft material, organic semiconductorGuest: A natural dyer | [The Art and Science of Natural Dyes](https://us02web.zoom.us/rec/play/VfJCGWYyeH3P3IQyCzSS1iTvAbYQdTbUL-j-uyo8dhoWIGHZPYtNH0ch79Glz-yRZ9rejTMw0YZpnbfu.GzqIjPogTfJYzqlW?continueMode=true)[Using Metals to change Colors of Natural Dyes](https://pubs.acs.org/doi/pdf/10.1021/ed083p1550?casa_token=gxSDSKFk4BYAAAAA:KHCs8sjLj21YH01YMYI2ScZ1NgvrIyr2_gxSK8azouHu2VBnsK6DlDCtI3Kcd4Kzdz-c4QWDNkRRjoPh) |
| **7** | 4-26 | Natural dyes science and engineeringIndigenous dyes | [Natural Dyes: Sources, Technology and Science](https://sisis.rz.htw-berlin.de/inh2010/12377993.pdf)[Natural Dyes: Sources, Chemistry, Application and Sustainability Issues](http://admin.umt.edu.pk/Media/Site/STD/FileManager/OsamaArticle/febarticles/Natural%20Dyes.pdf)[Application of Natural Dyes from Selected Indigenous Plants](https://medcraveonline.com/JTEFT/application-of-natural-dyes-from-selected-indigenous-plants-on-cotton-and-silk-fabrics.html) |

### 7. Course Requirements/Evaluation:

### Graded Assignments:

Craft autobiography 10 points

Craft instructions 10 points

Cheese project 10 points

Responses to journal article readings and book chapters: 60 points

Class participation 10 points

Curriculum project 10 points

Literature Review (Graduate Students) 30 points

Total: 110 or 140 points

### Grading Scale:

|  |  |
| --- | --- |
| Percentage | Grade |
| 91 -100% | A |
| 81 - 90 % | B |
| 71 - 80% | C |
| 70 % or below | F |

### *Craft Autobiography*

Think back to your earliest years, and describe your experiences making things with your hands. What did older family members craft? Did any particular craft experiences resonate with you? Did any become hobbies that you pursued for a period of time? What do these crafts do for you- what benefits have they provided? How have your crafting experiences changed over your lifetime? Describe what goes into a craft that you enjoy and describe any scientific principles that inform this craft. Antagonize your identity in this autobiography, for example being a man who enjoys knitting, or a woman who enjoys woodworking, and how that impacted you.

### *Craft Instructions*

Without consulting any textual (including on-line) sources, type up clear and complete instructions for something you know how to make that you consider involving craft practice and which doesn't require super-specialized equipment (e.g., rudiments of knitting, a recipe for cooking or baking, origami folding, etc.). Bring a hard copy and supplies to class. (You'll then exchange papers and materials and implement someone else's instructions.)

### *Cheese Project*

Working in pairs, make mozzarella cheese! (you will be provided with rennet, citric acid, salt, and instructions; you'll need to acquire a gallon of raw or pasteurized—not ultra-pasteurized—milk, a non-reactive [stainless steel] pot and long-handled spoon, long knife, colander, cooking thermometer [you'll need to read 90–185˚F], and rubber gloves [optional]). Write up the experience as if it were a lab assignment, including tasting notes ("results"), and bring the remaining results to class! Include a discussion section (by drawing on class concepts and readings) addressing: what makes cheese-making a craft practice (if and when indeed it is)?

*Curriculum Project*

Apply a particular craft to a science, math, or engineering lesson that could be taught in K-12 or in college. Develop a lesson plan that would help someone not only learn the craft, but the science, math, or engineering behind it. A lesson plan format will be provided to you.

*Quilt Square*

Using cloth, needle and thread, create a quilt square measuring exactly 12.5” x 12.5” that represents a scientific concept you learned. We will stitch these squares together to make a unified piece of art. You may embroider or paint or draw on your square, you can embellish the square with 3D items, and you can piece fabric together to make your square. You may use purchased fabrics or handmade ones.

*Literature Review (Graduate Students)*

Graduate students will choose a topic that relates to their academic field of interest and review the literature for research that relates to the intersection of that field and traditional crafts. The review must include at least 10 research articles and should be written in the style of the 2nd chapter of a dissertation. This paper will describe the research that has been done to date, and will compare, contrast, and connect the findings from the studies. Guidance will be provided in class.

**8. Professionalism**:

As faculty, staff, and students interact in professional settings, they are expected to demonstrate professional behaviors as defined in the College’s conceptual framework. These professional commitments or dispositions are listed below:

* Engage in responsible and ethical professional practices
* Contribute to collaborative learning communities
* Demonstrate a commitment to diversity
* Model and nurture intellectual vitality

**9.   Class Policy Statements:**

Participation:  Students are expected to attend class, bring required materials, and participate in all class discussions and participate in all activities.  It is the student’s responsibility to contact the instructor if assignment deadlines are not met.  Students are responsible for initiating arrangements for missed work.

Attendance/Absences:  Attendance is required at each class meeting.  Contact the instructor as soon as you know that you have to miss class for any reason. If an exam is missed, a make-up exam will be given only for University-approved excuses as outlined in the Student Policy Handbook [www.auburn.edu/studentpolicies](http://www.auburn.edu/studentpolicies) .  Arrangement to take the make-up exam must be made in advance.  Students who miss an exam because of illness need a doctor’s statement for verification of sickness and should clear the absence with the instructor the day they return to class.  All absences must be documented and cleared with the instructor **in advance**. All work missed, even class work, will need to be made up and turned in within one week. Homework is always due on the due-date, even if class is missed. Do not wait until the night before class to complete your assignments!

Unannounced quizzes:  There may be unannounced quizzes covering assigned readings.

Accommodations:  Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by e-mail. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).

Honesty Code:  The University Academic Honesty Code and the Student Policy Handbook Rules and Regulations pertaining to Cheating will apply to this class. All work must be original. All infractions of the Academic Honesty Code will be reported to the Provost. (Note: All written work will be scanned for plagiarism. Be sure you know what plagiarism is.) Cheating will likely result in dismissal from the Teacher Education Program, and may result in dismissal from the university.

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**10. Justification for Graduate Credit (for Graduate Credit Only)**

This course provides education doctoral students, masters students, current teachers, and pre-service teachers who desire an “A” Certificate opportunities to develop an in-depth understanding of how research on crafts can be applied to the classroom. This course provides graduate students in other fields with knowledge, skills, and experiences in science and traditional crafts, or folk engineering.

**THIS SYLLABUS IS A WORK IN PROGRESS. UPDATED VERSIONS WILL BE POSTED ON THE COURSE WEBSITE AND MODIFICATIONS TO ALL ASSIGNMENTS WILL BE MADE ON THE COURSE WEBSITE.**