ART 107 ART EXPLORATIONS:
Design for Digital Fabrication
Course Syllabus
UWM, Spring 2019
KSE 368
Instructor: Adam Hawk
Office Hours: by appointment
Email: hawk@uwm.edu

Catalog Description:
Special topics course in Art and Design for non-art majors

Course Objectives and Learning Outcomes:
- Provide a working foundation in sketching, interpreting, and creating computer-generated models
- Use Rhino 3D modeling software to create vector, surface and solid models
- Render 2D images of 3D models including lighting and environments using Keyshot rendering software
- Introduce students to 3D scanning using the Sense infrared scanner
- Provide students with the ability to describe the terminology, function, capabilities, and limitations of 2D and 3D computer aided design (CAD)

Course Description:
This course will introduce students to digital drawing and design skills that will be used to facilitate geometric problem-solving skills involving 2D and 3D models. Models will be processed through a variety of digital fabrication processes including 3D printing, 3D scanning, laser cutting and vinyl cutting. This course provides students with the tools to develop a thorough grounding in communication techniques and strategies for the professional presentation of design work.

Course Content:
- Linear Construction/Multi-Layered Compositions/Vinyl Cutting
- Digital Modeling/Dimensional Reconstruction & Presentation/Rendering
- 3D Scanning/Directional Slicing/Laser Cutting & Fabrication
- 3D Printed Ring/Polysurface Design/Service Outsourcing

Methods of Instruction:
- Lectures, presentations, and group discussions on various principles and modes of production occurring in the field of Digital Fabrication and Design
- Demonstrations on digital fabrication and design techniques and processes
• Group and individual critiques

Workload Statement
The credit hour policy states: “Study leading to one semester credit represents an investment of time by the average student of not fewer than 48 hours for class contact in lectures, for laboratories, examinations, tutorials and recitations, and for preparation and study; or a demonstration by the student of learning equivalent to that established as the expected product of such a period of study.” To meet the minimum requirements of the course, the average student should expect to spend approximately 144 hours on activities in and outside of class.

ART 107 addresses the UW System Shared Learning Goals (SLG) Arts Distribution Definition:
1. Knowledge of Human Cultures and the Natural World including breadth of knowledge and the ability to think beyond one’s discipline, major or area of concentration. This knowledge can be gained through the study of the arts, humanities, languages, sciences and social studies.
2. Critical and Creative Thinking Skills including inquiry, problem solving, and higher order qualitative and quantitative reasoning.
3. Effective Communication Skills including listening, speaking, reading, writing, and information literacy.

This course meets the following GER Objectives
1. Understanding the rules of methods and processes
2. Acquisition of cultural and historical perspectives on the world
3. Appreciation of creativity

This course also addresses the Arts Divisional Criteria Definition:
A branch of learning focusing on the conscious use of skill and creative imagination in the production of artistic objects or performances that stress values that stand outside conventional ideas of utility.

Arts Divisional Criteria:
1. Students will demonstrate comprehension of historical, philosophical, theoretical or aesthetic perspectives commonly used in the understanding of a specific art.
2. Students will apply knowledge of artistic principles, conventions, methods, and practices through the creation or production of works of art; and
3. Students will demonstrate an ability to compare and contrast the expressive and formal features of different artistic media and/or cultural traditions.

This course satisfies the GER program criteria for the Arts by:
• Requiring students to research and analyze the artistic production of current and historically significant practitioners in various discipline of art and design. (SLG and AD Criterion 1)
• Assigning students projects with open ended solutions that require them to engage their critical and creative thinking skills while simultaneously introducing
them to the materials and tools utilized in the production of 3D objects. (SLG and AD criterion 2)

- Requiring students to demonstrate a basic understanding of the critical analysis process by conducting verbal and written critiques over the projects produced in the class. (SLG and AD Criterion 3)

These criteria are met through class lectures, individual projects, small group projects, required readings, gallery/exhibition visits with written responses and online interactive discussions.

**GER Assignment/Assessment**
Please see the GER Arts project and assessment rubric at the end of this document.

**Required Readings**
A textbook is not required for the class. Instructional information and readings will be posted online.

**Required Materials/Supplies**
Some materials will be provided as communal studio materials and will be covered by a studio materials fee. Students will be responsible for purchasing any non-communal studio materials that they need to complete their assignments.

**Required tools and equipment**
Safety glasses
Closed toe shoes
Digital calipers
Pencils
Ruler
3-ring binder
Copier paper for sketching (punched and placed in notebook)
USB dive/external hard drive/Google Drive/Dropbox account or some kind file storage device

(optional) A desktop/laptop that is suitable for running Rhino 5.0 software (if you prefer to work outside of the lab) (optional) two button/scroll mouse (optional) Rhino 5.0 software for MacOSX or PC
Dust mask (suggested)
Earplugs (when needed)

**Studio Course Fee**
A $99.00 course fee will be charged for use of consumables and communal materials provided by the studio. Any additional materials needed to complete projects will be the responsibility of the student.

If the Student wishes to opt-out of the College acquiring their program materials, the Student may contact Chad Bridgewater on or before 02/01/2019; if no contact is made by that time, the Student will be deemed to have opted-in. Students opting out of this
process will be reimbursed for the cost of program materials and will be personally responsible to acquire these materials. Note that materials may cost significantly more when not obtained through the College.

**Attendance Policy**
As stated in the student handbook, student absences are not expected to exceed more than 10% of the number of the classes scheduled for the semester (3 classes), after which the instructor may elect to lower the student’s grade for the course.

- 4\(^{th}\) unexcused absence will result in 1 full letter reduction of final grade.
- 5\(^{th}\) unexcused absence will result in 2 full letter reductions of final grade.
- 6\(^{th}\) unexcused absence will result in 3 full letter reductions of final grade.
- 7\(^{th}\) unexcused absence will result in automatic failure of class.

The allotted absences are to accommodate routine illness, weddings, car trouble etc. Doctor appointments, advisor conferences, trips to supply stores and employment, etc., should not be scheduled to conflict with class when at all possible. Faculty cannot and will not be placed in the position of determining which absences are excusable and which are not.

All students are expected to attend class on a regular basis. Prolonged illness should be verified by a physician and may require the student to withdraw from class if they cannot complete work in a comprehensive and timely manner.

If student is unavoidably late or absent, it is up to them to contact their classmates and get the information missed. If student contacts instructor ahead of time, instructor will make every effort to apprise student of the information they will be missing, but will not give individualized lectures for absentees or latecomers. Do not email the instructor asking "what did I miss today?"

Students should avoid attending class if they are ill. This is what the "free" absences are for. Recent research suggests that influenza is spread through simply breathing (not only coughing or sneezing). Individuals will recover more quickly if they stay home and rest. If they must go out and about, wearing a face mask over nose and mouth will reduce transmission, as well as alerting others to avoid contact.

Instructor will begin class promptly. Do not be late! Two late arrivals, or early departures, will be counted as one full absence.

Attendance will be calculated into students' final grade. This course has a total of 30 class periods, every absence will result in the loss of one point. Every late or early departure counts as an additional reduction of .5 point. At the end of the semester students’ total point score will be averaged and count towards 5% of their final grade.

*Example: 3 absences and 4 late arrivals = 25/30 = 5% of your final grade.*

**Accommodations for Students with Disabilities**
In the spirit of providing equal access to students with disabilities and in compliance with state and federal laws, the University is required to provide reasonable accommodations to students with medically documented disabilities. Students are to provide notification at their earliest opportunity to instructors to indicate the accommodations they may need in class. Students who do not yet have a documentation, but need accommodations should work with the Accessibility Resource Center (ARC).

Please contact ARC at 414-229-5822. ARC Main office is located on the first floor of Mitchell Hall, directly behind ACL 120. http://www4.uwm.edu/arc

Course Performance and Evaluation
Modelers should save or archive their model files. Files of the rendered image should also be saved. Make sure that wherever your model is saved, you include your name and the date on the label. These files will be used as examples for other students and may be posted on an Internet gallery.
The studio computers are not safe places to store your files. The lab user account is wiped each time a user logs back into their account, thus wiping the desktop and some associated location on the computer hard drive; thus the need for external file storage. Losing a file will not be a valid excuse for missing an assignment.

Projects:
Projects will be introduced during class, followed by a group discussion and individual meetings to discuss project ideas. All projects are to be completed by the assigned due date. Unless prior arrangements have been made with the instructor, projects handed in after the assigned due date will be reduced by 5 points for each day late. Do not expect to finish all projects during the assigned class time. Students will need to put in additional hours outside of class to complete their projects in a timely manner. Major projects will count for 40% of your overall grade.

Project grades will be based on the following:
• Creativity
• Execution and craftsmanship
• Concept development
• Use of classroom time
• Participation in class critiques

Makeup of Final Grade

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>TOTAL POSSIBLE POINTS</th>
<th>COURSE VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhino Exercises</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Project 1</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Project 2</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Project 3</td>
<td>100</td>
<td>12.5%</td>
</tr>
<tr>
<td>Project 4</td>
<td>100</td>
<td>12.5%</td>
</tr>
<tr>
<td>Project 5</td>
<td>100</td>
<td>15%</td>
</tr>
<tr>
<td>Project 6</td>
<td>100</td>
<td>15%</td>
</tr>
<tr>
<td>Notebook/Sketchbook</td>
<td>100</td>
<td>10%</td>
</tr>
<tr>
<td>Attendance</td>
<td>30</td>
<td>5%</td>
</tr>
</tbody>
</table>
Grade A – An Outstanding Student
• Demonstrates leadership abilities in the following areas: process, realization and professionalism
• Demonstrates mastery of design process
• Exceeds required number of solutions for stated problem continually
• Exhibits outstanding technical and conceptual abilities consistently
• Respects, yet creatively challenges and pushes the boundaries, of all assignments consistently
• Engages in classroom discourse by thinking beyond the parameters of the assignment
• Takes initiative continually
• Maintains perfect or near perfect attendance
• Exceeds course goals and objectives continually

Grade B – An Above Average Student
• Engages in the design process
• Exceeds the required number of solutions for a stated problem
• Exceeds the requirements of assignments both technically and conceptually
• Engages in classroom discourse by thinking beyond the parameters of the assignment
• Takes initiative
• Maintains perfect or near perfect attendance
• Exceeds course goals and objectives

Grade C – An Average Student
• Engages in the design process
• Produces the required number of solutions for a stated problem
• Meets the requirements of assignments both technically and conceptually
• Participates in classroom discourse (critique: verbal and written articulation)
• Meets attendance requirements
• Meets course goals and objectives

Grade D – A Below Average Student
• Shows no particular level of commitment
• Does not follow the design process
• Produces less than the required number of solutions for a stated problem
• Lacks enthusiasm
• May or may not meet the requirements of assignments both technically and conceptually
• Rarely participates in classroom discourse (critique: verbal and written articulation)
• May or may not meet attendance requirements
• Does not meet all course goals and objectives
Grade F – An Unsatisfactory Student
• Shows no level of commitment
• Does not follow the design process nor demonstrate an understanding of its application
• Does not produce the required number of solutions
• Lacks enthusiasm, motivation and an ability to work independently
• Does not meet the requirements of assignments both technically and conceptually
• Does not participate in classroom discourse (critique: verbal and written articulation)
• Does not meet attendance requirements
• Lacks initiative in taking responsibility for their education
• Does not meet all course goals and objectives

A = 94-100
A- = 90-93
B+ = 86-89
B = 83-85
B- = 80-82
C+ = 76-79
C = 73-75
C- = 70-72
D+ = 66-69
D = 63-65
D- = 60-62
F = < 60

Final Exam Time
Thursday May 16th 12:30-2:30PM
Resubmission, work return and cleanup will be held during the official University final exam time schedule.
http://www4.uwm.edu/secu/docs/other/S22.htm

Critiques
Students are expected to attend all scheduled group critiques, even if their work is not finished. Missing a critique is equivalent to missing an exam and you will receive a reduction of one whole letter off of your final course grade. Critiques will be conducted toward the end of each major project. Critiques are designed to be an opportunity to discuss the work and receive constructive criticism from the instructor and the student’s peers concerning how the work is received and should not be viewed as a personal attack. Please be honest and respectful to each other during critiques.

(For more ambitious projects students may be given an extension to complete their projects based on the instructor’s discretion.)

Tentative Critique Schedule:
Project 1 “Tattoo You”: Critique Tuesday February 19, 2019
Project 2 “Put a Ring on It”: Critique Thursday May 9, 2019
Project 3 “All of the Lights”: Critique Wednesday May 15, 2019

Shop Maintenance
Because multiple classes share the shop, students must clean up communal work areas at the end of each work session. Make sure to leave things cleaner than you found them. Any work left in communal work areas without permission will be discarded. Works in progress must be placed in designated storage areas. It is a good practice to place your name on your projects and working materials so they are not mistaken for communal materials. Shop maintenance will be factored into your final grade.

Open Studio Hours
Most projects will require students to spend additional hours outside of scheduled class time to get projects done in a timely manner. Students will be given access to the digital fabrication lab and tools during the open shop hours. The scheduled open hours will be posted outside the shop entrance door. There is no paid lab monitor, hours are conducted by advanced students but they are not there for academic instruction. Students must follow the shop policies and safety directives. Anyone not complying with the rules will lose access to the lab. Your use of outside studio hours will be factored into your final grade. Students will be expected to spend a minimum of 4 hours a week outside of class utilizing open studio hours. The 4 hours per week open studio requirement will count for 10% of your overall grade.

Email Policy:
Do not expect a response to emails earlier than 2 days. Emails should be composed letters in which you address the person to whom you are writing, state your questions and concerns and finish the letter with your full name. Email is not to be used as a public forum. General questions of course content and policy should be directed directly to the instructor during Office Hours. Emails that do not follow these basic guidelines will not be responded to.

ARTIST NOW! (Guest Lecture Series)
It is highly recommended that students attend these lectures that take place on Wednesdays at 7:30 pm in the Arts Center Lecture Hall on the UWM campus. The lectures are free and open to the public. Students who attend at-least 75 % of these talks can earn extra credit points toward their final grade.

Health Insurance
It is strongly recommended that all students have health insurance that includes emergency room and hospitalization coverage. Go to: Healthcare.gov

UWM Statement on Copyright/Plagiarism
“Copyright is a form of protection provided by the laws of the United States (title 17, U.S. Code) to the authors of “original works of authorship,” including literary, dramatic, musical, artistic, and certain other intellectual works. This protection is available to
both published and unpublished works. Section 106 of the 1976 Copyright Act generally gives the owner of copyright the exclusive right to do and to authorize others to use their materials. You must get permission to use copyrighted original works of authorship if you plan to make your project available to the public in any way.”

In addition the University has a strict policy on Academic misconduct. Cheating on exams or plagiarism are violations of the academic honor code and carry severe sanctions, including failing a course or even suspension or dismissal from the University. http://uwm.edu/academicaffairs/facultystaff/policies/academic-misconduct/

**University Policies Pertaining to Students**
This includes university policy on religious observation, active military, academic grievances procedure and more helpful information. http://www.uwm.edu/Dept/SecU/SyllabusLinks.pdf
ART 107 Art Explorations: Design for Digital Fabrication
GER Project Description and Rubric

GER Assignment Brief: Elements of
Principles of design run through 2D and 3D forms across various area of art and design. These repeating elements can be used to emphasize a specific concepts, feelings and associations that communicate ideas that can be relative to a viewer’s own experiences. In addition, a material and surface treatment of an object can also relay encoded information and relationships that can be articulated by an artist or designer.

Problem:
The 3D printed ring is an introductory problem in designing and fabricating a functional three-dimensional form employing basic 3D modeling and 3D printing techniques. Designs for the 3D printed ring must be derived from architectural studies. These designs may be the result of large-scale architecture or be derived from close observation of details (doors, stairs, windows, heating and cooling systems, etc.). No ring design may be strictly circular or oval. The ring may contain curvilinear elements, but may not be round or oval in the overall design. The ring must be designed with 3D printing in mind; final printed material, print tolerance, build platform size of the printer, and wall thicknesses and tolerances must be considered.

Learning Outcomes:
• Ability to analyze artist research and reference materials to further develop project concepts.
• Exhibit a moderate level of competency in the application of the various technical processes demonstrated for the project.
• Exhibit the ability to analyze a work of art using the formal analysis process in written and oral form.

Things to consider:
• The relationship of the object to the viewer
• Creating visual pathways to generate movement
• Abstraction vs. Realism
• The non-neutrality of materials
• Metaphor vs. study

Getting started:
1. Examine elements of architecture including full buildings, bridges, large scale machines, objects of fantasy as well as the details and specific elements of a larger composition.
2. Create thumbnail sketches and capture images of the objects that you find interesting. You should compile a visual inventory of at least 20 reference images.
3. From your reference images begin to break the object down into basic geometric shapes to gain a better understanding of how to rearticulate the form in a wearable format.
4. Once you have settled on a design and have received approval from the instructor begin construction. Formulate a project schedule to get all necessary tasks done in a timely manner.

Criteria for the oral critique:
A critique is an oral or written discussion strategy used to analyze, describe, and interpret works of art. Critiques help students hone their persuasive oral and writing skills.

For the oral critique, each student will be assigned to evaluate one of his, her or their classmate's works using the critical analysis process. The oral critique should be approximately five minutes long and cover the following four areas:

- Description- objectively describe the elements of the work (i.e., line, movement, light, space, color, etc.).
- Analysis- describe how the work is organized as a complete composition. What design principles have been employed to construct the work.
- Interpretation- describe the meaning of the work based on the evidence you have gathered from the description and analysis of the work.
- Evaluation-assess the quality of the work based on the evidence you have gathered and its relevance to other works that follow a similar direction.

Scoring

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creativity/challenging</td>
<td>30</td>
</tr>
<tr>
<td>Execution and craftsmanship</td>
<td>30</td>
</tr>
<tr>
<td>Concept development/Sketchbook</td>
<td>20</td>
</tr>
<tr>
<td>Use of classroom time and open studio hours</td>
<td>10</td>
</tr>
<tr>
<td>Oral critique</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Project Timeline:
- Week 8 (March 14) Introduce Project and Demonstrations
- Week 10 (March 25th – 27th ) Concepts and refined concepts
  Initial research and sketches due March 25th, Refined research due March 27th
- Week 11 (April 2nd – April 4th) Digital Construction of Object
- Week 12 (April 9th – 11th) Refine tolerances and solidarity
  *Upload .stl to Shapeways to print, upload .3dm and Keyshot rendering to D2L by midnight*
- Week 13 – 15 (April 15 – May 2nd) Wait for shipping
- Week 16 (May 7th - May 9th) Final Finish Work
  *Critique on Thursday May 9th*
Rubric For Evaluating GER Assignment:

**Part I: Sculptural Object**

*The planning and execution of the project will be worth up to 90% of the total 100 points possible for the assignment.*

<table>
<thead>
<tr>
<th>Creative Project Criteria</th>
<th>Below Average (0-69%)</th>
<th>Average (70-79%)</th>
<th>Good (80-89%)</th>
<th>Excellent (90-100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creativity/Challenging (AD Criterion 2)</td>
<td>0-20.7 points Project does not explore the techniques demonstrated and creative solutions to the problem are not evident</td>
<td>21-23.7 points Project explores some of the techniques demonstrated and creative solutions are evident, but not sufficiently resolved</td>
<td>24-26.7 points Project explores most of the techniques demonstrated and creative solutions are evident and sufficiently resolved</td>
<td>27-30 points Project explores all of the techniques demonstrated and creative solutions are evident and elevate the composition</td>
</tr>
<tr>
<td>Execution and Craftsmanship (AD Criterion 2)</td>
<td>0-20.7 points Project does not appear to be complete because of poor execution and craftsmanship</td>
<td>21-23.7 points Project appears to be complete but the craftsmanship still needs refinement</td>
<td>24-26.7 points Project appears to be complete and the craftsmanship does not need refinement</td>
<td>27-30 points Project appears to be complete and the craftsmanship enhances the viewers experience</td>
</tr>
<tr>
<td>Concept Development (AD Criterion 1)</td>
<td>0-13.8 points Did not explore more than one idea or conduct any research to develop the final concept</td>
<td>14-15.8 points Explored at least three ideas, but did not conduct a sufficient amount of research to develop the final concept</td>
<td>16-17.8 points Explored at least four ideas and conducted sufficient research to develop the final concept</td>
<td>18-20 points Explored at least five ideas and conducted significant research to develop the final concept</td>
</tr>
<tr>
<td>Use of Classroom Time and Open Studio Hours</td>
<td>0-6.9 points Did not maximize allotted classroom time or open studio hours to complete project</td>
<td>7-7.9 points Maximized allotted classroom time, but did not utilize open studio hours to complete project</td>
<td>8-8.9 points Maximized allotted classroom time and a sufficient use of open studio hours to complete project</td>
<td>9-10 points Maximized allotted classroom time and open studio hours to complete the project</td>
</tr>
</tbody>
</table>
Part II: Oral Critique
The oral critique will be worth up to 10% of the total 100 points possible for the assignment.

<table>
<thead>
<tr>
<th>Written Critique Criteria</th>
<th>Below Average (0-69%)</th>
<th>Average (70-79%)</th>
<th>Good (80-89%)</th>
<th>Excellent (90-100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description (AD Criterion 3)</td>
<td>0-1.725 points Descriptions are incomplete</td>
<td>1.75-1.975 points Makes a detailed description of 70% of the subject matter.</td>
<td>2-2.225 points Makes a detail description of most of the subject matter.</td>
<td>2.25-2.5 points Makes a complete and detailed description of the subject matter.</td>
</tr>
<tr>
<td>Analysis (AD Criterion 3)</td>
<td>0-1.725 points Does not demonstrate a clear understanding of the principles and elements of design and how they relate to the work that is being reviewed</td>
<td>1.75-1.975 points Demonstrates a basic understanding of the principles and elements of design and how they relate to the work that is being reviewed</td>
<td>2-2.225 points Demonstrates an ability to recognize most of the principles and elements of design and how they are applied in the work that is being reviewed</td>
<td>2.25-2.5 points Demonstrates an ability to recognize the vast majority of the principles and elements of design and how they are applied in the work that is being reviewed</td>
</tr>
<tr>
<td>Interpretation (AD Criterion 3)</td>
<td>0-1.725 points Student had trouble interpreting work being reviewed</td>
<td>1.75-1.975 points Student can interpret the work on a superficial level but struggles to support explanation with evidence from the work</td>
<td>2-2.225 points Student can interpret the literal meaning of the work accurately with supporting evidence from the work</td>
<td>2.25-2.5 points Student can go beyond the literal meaning of the work to formulate a hypothesis that is supported by evidence collected from the work</td>
</tr>
<tr>
<td>Evaluation (AD Criterion 3)</td>
<td>0-1.725 points Superficial evaluation of the work based on personal opinion</td>
<td>1.75-1.975 points Able to evaluate the work based on an acceptable hypothesis of the formal analysis of the work</td>
<td>2-2.225 points Able to evaluate the work based on a strong hypothesis of the formal analysis of the work</td>
<td>2.25-2.5 points Able to evaluate the work based on a strong hypothesis and relevance to other works of art that follow a similar trajectory</td>
</tr>
</tbody>
</table>