School of the Arts, Media, Performance and Design
Computational Arts/Visual Art & Art History
FA/DATT 3940, FA/VISA 3033 3.0 Fall Term 2016

Course director: Haru (Hyunkyung) Ji
haruoneday@gmail.com
Course website: http://jiharu.github.io/visa3033/
Course portfolio: http://2016visa3033.tumblr.com/
Office: 229 Goldfarb Centre for Fine Arts
Office hours: Wed / Thur by appointment
Studio class hours: Wednesday 8:30 to 12:30
Studio location: ACW 102 - Art and Technology Learning Laboratory

Modeling for 3D Fabrication

Expanded Course Description:

Modeling for 3D Fabrication is an art studio class to learn theoretical and practical knowledge in constructing and managing 3D solid modeling data, which can be processed later for 3D fabrication, and empower student's creative expression. Each class consists of case studies, tutorials, hands-on practice, and critiques to accomplish both conceptual and practical approaches. Evaluation will be mainly via one individual mid-term project and one group final-term project and minor assignments throughout the semester taking a practice-based arts research approach to expressive 3D modeling for 3D fabrication.

Digital modeling and fabrication is considered as a medium rather than a tool. Students will carry out interdisciplinary artistic research of innovative and exquisite 3D fabrication case studies to gain firm understanding and inspire new creative ideas. Based on this, students will pursue further research and practice on how to use digital technologies to construct 3D models for 3D printing. The 3D software used in the class includes Meshlab, Meshmixer, 123D, Blender, Autodesk Maya and many more, to extend students' art-based problem-solving abilities and support their unique 3D fabricated expression. It is a highly interdisciplinary and complex subject of artistic expression and technological understanding, therefore needing a creative open mindset and dedication from students to succeed in its goal.

Course Objectives:

- To build a framework of skills and knowledge, an understanding of processes and terminologies, to create and modify 3D modeling data for fabrication.
- To understand fundamental components and their positions within the production pipeline of 3D modeling and fabrication.
- To develop awareness of current 3D fabrication art practice through diverse case studies.
- To articulate ideas and develop artistic problem-solving methods of interdisciplinary research, and by incremental refinement find the challenges and possibilities inherent in the construction process of 3D modeling and fabrication.
- To explore independent artistic expression through experimentation.

It is expected that the majority of the assignments will be completed outside of class time. If you plan to use the lab outside of your class time, you must purchase a Digital Media Lab Card. Lab Cards are $25 for the year, or $15 for one term. The Digital Media Lab Card can be purchased in the front desk of the Computational Arts/Visual Arts and Art History office, located on the second floor of the Goldfarb Centre for Fine Arts. The office is open Monday to Friday, 8:30am-4:30pm. Once you have paid, take your receipt to Frank Tsonis in ACW 102 and he will issue you a card.

Course Format:

- Class time is devoted to studio work along with lectures and demonstrations by the instructor, group or individual critiques, and occasional student presentations.
- Lecture presentations throughout the term introduce students to examples of artworks and artists working with materials, construction techniques, issues and themes relevant to the assigned projects and to contemporary art practice.
- Demonstrations focus on construction processes and materials relevant to the projects and provide information on structural integrity and effective craftsmanship.
- Individual or group critiques along with ongoing instructor feedback provide a context for analysis and discussion.
- Occasional student presentations will help to differentiate and elaborate their artistic interests and to inspire each other's further growth.
- Hands-on practice is the essential means by which students will investigate spatial formation problem-solving abilities.
- Periodically there will be in class work periods, but it is expected that the majority of the assignments will be completed outside of class time.
- Students will build their work progress portfolio throughout the class.

Project Description:

More details regarding projects and assignments will be announced in class.

- **Mid-term project (individual):** An arts research presentation + first print + modeling data
    - An arts research presentation: based on class materials, develop your own preference and artistic direction regarding the class subject.
    - First 3D printing and its modeling data: applying the chainmail structure, build your 3D modeling and print it at approximately 2 inch (5 cm) size.
- **Final-term project (group):** An arts research presentation + print + modeling data
    - An arts research presentation: based on group discussion and following research and practice, elaborate an artistic direction regarding the class subject.
    - 3D printing and its modeling data: select a critical part from your project idea focusing on visualization of the idea and the practicalities to build it in time and budget.
- **Assignments:** simple hands-on practices designed to help students' progress following each 3D modeling and 3D fabrication subtopic. Completion in time and proper targeting to the subject are the two evaluation criteria.
- **Portfolio:** short artist statement (1 paragraph) + reference + photo record of processes and final result.

Issues to consider:

- Please be patient to repeat practice exercises until you feel familiar with the logic & structure of the 3D modeling and fabrication, and their pipeline, processes, and vocabularies since the complexities can easily overwhelm. If you have any questions or difficulties in following, don't hesitate to ask the instructors.
- Develop your unique preference as a maker/producer among the variety of 3D modeling and 3D fabrication methods and technologies.

As this is a cumulative learning environment attendance in all classes is mandatory. Failure to attend class and arrive to class on time will result in academic penalty on your final grade, and/or a request for withdrawal from the course. Exceptions to the lateness penalty for valid reasons such as illness, compassionate grounds, etc., will be considered by the Course Instructor but will require supporting documentation (e.g., a doctor's letter).

Projects and assignments to be marked for course credit will be submitted through Moodle, or google drive if necessary, on the scheduled date. All work submitted for evaluation will be original work created in full by the student. York students are required to maintain high standards of academic integrity and are subject to the Senate Policy on Academic Honesty (http://www.yorku.ca/secretariat/legislation/senate/acadhone.htm). It is highly recommended that all students complete the Academic Integrity Tutorial (http://www.yorku.ca/tutorial/academic_integrity/).

Sharing information is recommended to accelerate the speed of progress, unless it interrupts other students' concentration. Students will share their assignments through the Tumblr website (http://2016visa3033.tumblr.com/). Questions and discussions are encouraged during class time.

Grade Breakdown:

Mid-term project	35%
Final-term project	35%
Assignments	20%
Participation and portfolio	10%

The evaluation will be based on cumulative achievement, regular attendance and the student's participation in research and practice. It is expected that students will show a commitment to completing all projects and assignments with creative & aesthetic solutions based consistent work habits both in class time and outside of class time.

*** Please Note: The last day to drop this course without receiving a grade is the last day of classes.**

Evaluation/Grading Criteria:

- Creativity and concept development: skills applied to problem solving processes.
- The progress and engagement of the student in their research studies, as well as their curiosity and motivation to learn and achieve.
- Commitment (includes attendance, participation, completing work on time)
- Quality of the work produced; with the balance of the student's artistic expression & sensitivity as well as technical understanding, with integration of techniques and subject.

Grade	Grade Point	Per-Cent Range	Description
A+	9	90-100	Exceptional
A	8	80-89	Excellent
B+	7	75-79	Very Good
B	6	70-74	Good
C+	5	65-69	Competent
C	4	60-64	Fairly Competent
D+	3	55-59	Passing

D	2	50-54	Marginally Passing
E	1	Marginally below 50	Marginally Failing
F	0	Below 50	Failing

(For a full description of York grading system see the York University Undergraduate Calendar - http://calendars.registrar.yorku.ca/pdfs/ug2004cal/calug04_5_acadinfo.pdf)

Computer Lab:

There will be general introduction from the lab technician in the first class. Please clean your seat and log out before you leave for a next lab session. If you have a question about using lab, address it to the lab technician or instructor.

Please turn your cell phones off before entering class and/or the computer lab.

Supplies:

Students will be required to supply headphones in the lab to follow web tutorials.

Sketchbook & pencils for sketching your ideas
Headphones for tutorials
USB or cloud storage to save and carry your data

When we use a 3D printer, students need to follow strict protocols, which will be announced later.

Course Texts and References:

- Class website: http://jiharu.github.io/visa3033/

Lecture materials, notices, and more references will be updated to the course website.

3D fabrication and visual arts

- Printing things : visions and essentials for 3d printing, 2014. (Library: York & Toronto public)
- 3D Technology in Fine Art and Craft by Bridgette Mongeon, Focal Press, 2015 (Library: Toronto public, SafariOnline)
- 3D Printing for Artists, Designers and Makers: Technology Crossing Art and Industry by Steve Hoskins, 2013 (Library: Toronto public)

3D fabrication case studies

- Digital Crafts: Industrial Technologies for Applied Artists and Designer Makers by Ann Marie Shillito, 2013 (Library: York & Toronto public)
- Crafted: Objects in Flux by Emily Zilber, 2015 (Library: York & Toronto public)
- Digital Handmade: Craftsmanship In The New Industrial Revolution Hardcover by Lucy Johnston, 2015 (Library: Toronto public)
- Postdigital Artisans: Craftsmanship With a New Aesthetic in Fashion, Art, Design and Architecture, 2015 (Library: York & Toronto public)

3D modeling for 3D fabrication

- 3D printing with Autodesk 123D®, Tinkercad® by Lydia Sloan Cline, 2015 (Library: York, Toronto public): electronic resource available.
- 3D Modeling and Printing with Tinkercad®: Create and Print Your Own 3D Models by James Floyd Kelly, 2014 (Library: Toronto public, SafariOnline): electronic resource available.
- Getting Started with 3D Printing by Nick Kloski, Liza Wallach Kloski, 2016 (Library: Toronto public, SafariOnline): electronic resource available.
- Make: Design for 3D Printing by Tatiana Reinhard, Bertier Luyt, Samuel N. Bernier, 2015 (Library: Toronto public, SafariOnline): electronic resource available.
- Beginning Design for 3D Printing by Joe Micallef, 2015 (Library: Toronto public, SafariOnline): electronic resource available. (Library: SafariOnline): electronic resource available.
- Beginning Google SketchUp for 3D Printing by Sandeep Singh, 2010 (Library: York, Toronto public, SafariOnline): electronic resource available.
- More on Autodesk, Blender, SketchUp related books

3D fabrication

- 3D Printing: Build Your Own 3D Printer and Print Your Own 3D Objects by James Floyd Kelly, 2013 (Library: Toronto public, SafariOnline)
- Practical 3D printers: the science and art of 3D printing by Brian Evans, 2012 (Library: York, Toronto public, SafariOnline): electronic resource available.
- Mastering 3D printing by Joan Horvath, 2014 (Library: York, Toronto public, SafariOnline): electronic resource available.
- Maintaining and troubleshooting your 3D printer by Charles Bell, 2014 (Library: York): electronic resource available.
- 3D Printing for Architects with MakerBot by Matthew B. Stokes, 2013 (Library: York, Toronto public, SafariOnline): electronic resource available.

Essays about 3D fabrication

- Fabricated : The New World of 3D Printing by Hod Lipson, Melba Kurman, 2013 (Library: York, Toronto public, SafariOnline): electronic resource available.
- The Real Thing: Essays on Making in the Modern World by Tanya Harrod, 2015

TED talks

- Ted talk - Lisa Harouni: A primer on 3D printing, Nov 2011 [14:49]
- Tedx talk - Making the Unmakeable - The 3rd Industrial Revolution: Joshua Harker at TEDxBinghamtonUniversity, 2013 [17:17]

Important Course Information For Students:

All students are expected to familiarize themselves with the following information, available on the Senate Committee on Academic Standards, Curriculum & Pedagogy webpage (see Reports, Initiatives, Documents)

- http://www.yorku.ca/secretariat/senate/committees/ascp/documents/CourseInformationForStudentsAugust2012.pdf
- Senate Policy on Academic Honesty and the Academic Integrity Website
- Ethics Review Process for research involving human participants
- Course requirement accommodation for students with disabilities, including physical, medical, systemic, learning and psychiatric disabilities
- Student Conduct Standards

- Religious Observance Accommodation

Course Schedule:

Week 1: Introduction: class, subject, projects. Tutorial & hands-on practice: 3D printable bracelet using http://n-e-r-v-o-u-s.com/kinematicsHome.

Week 2: Theory, case studies. Tutorial & hands-on practice: voronoi bunny using Meshmixer and other open programs.

Week 3: Theory, case studies. Tutorial & hands-on practice: using Shapeways.

Week 4: Theory, case studies. The fundamentals of 3D modeling. Tutorial & hands-on practice: 3D chainmail using Blender.

Week 5: Theory, case studies. The fundamentals of 3D fabrication. Tutorial & hands-on practice: 3D photo scanning.

Week 6: Mid-term presentation, first print due.

Week 7: 3D modeling lecture. Case studies. Tutorial. Hands-on practice: 3D object scanning using a scanner.

Week 8: 3D modeling lecture. Case studies. Tutorial. Hands-on practice: 3D human scanning using Kinect sensor.

Week 9: 3D modeling lecture. Case studies. Tutorial. Hands-on practice.

Week 10: 3D fabrication lecture. Case studies. Tutorial. Hands-on practice.

Week 11: 3D fabrication lecture. Case studies. Tutorial. Hands-on practice.

Week 12: Final-term presentation (group-work), final print due, group critique & grading