**School of Architecture | Georgia Tech | Fall 20xx**

ARCH 2020: Media + Modeling II (3 credits)

Credit Hours: 3 credits (3 contact hours)

Days and hours of class: Tues/Thurs 3:00 – 4:15pm

Instructor: Name

Office location/Email address

Office Hours

**Course Description** (from the Catalog) Go to <http://www.catalog.gatech.edu/colleges/coa/architecture/#coursestext> to find the course description for the class.

Advanced approaches to two and three dimensional modeling and representation in architecture using both manual and digital media and techniques.

Parametric modeling, scripting and advanced fabrication technologies have become an integral part of contemporary architectural practice, in which architects use an amalgam of mixed skills reaching out to other disciplines such as computing, engineering, art and design. This class teaches techniques in parametric modeling and explores digital tools as design instruments for architectural design.

This course will introduce students to parametric modeling, design analysis and diagramming tools through Rhinoceros and Grasshopper. Students will be introduced to alternative ways of parametric geometry in Grasshopper through various tutorials and examples. Assignments will cover different types of parametric geometry, compositional complexity and introduce students to different aspects of systems thinking.

**Instructional Methods**

The class will be treated as an independent seminar to establish parametric design fundamentals while facilitating technical skill development. The assignments for the class will foreground technological aspects of production such as: digital modeling, visualization, diagram production, solar analysis and optimization through data sets.

The class is structured into two parts that will facilitate different learning outcomes to establish core skills necessary for design studios:

1. Interface/Components/Parameters/Data Management, Scalar Component Types, Operators Conditional Statements, Range / Series / Interval , Functions, Lists, Weaving Data, Shifting Data, Export to Excel, Vectors, Attractor, Curves, Surface Structuring, Families with Sequences, Ranges, Lines and Grids, Nested Lists and Basic Data Management, Fabrication tools, Catenary, Mesh based tools, Solar Analysis, Lunchbox, Conditionals, Functions.
2. Techniques from part 1 will be applied to a design project following three steps:

* A Parti and Massing: geometric diagrams, parametric modeling, variations
* B Massing and Patterning: parametric modeling, diagramming, variations
* C Systems: parametric modeling, diagramming, variations, renderings, 3d prints

# Learning Objectives

1. Students will be able to use parametric design technologies to understand complex architectural geometry and to implement their design proposals in a parametric model.
2. Students will be able to demonstrate the ability to use representational media to communicate formal elements of their design project.
3. Students will be able to produce physical constructions from their digital representations.
4. Students will be able to use Grasshopper and software extensions to produce various digital prototypes.
5. Students will be able to evaluate, synthesize and conceptualize software functions and methods of parametric modeling and design.

**Course Procedure and Organization**

The class is lecture/tutorial based. Students are encouraged to take notes and follow the workshop sessions by working on either given examples or their own design models. In parallel to lectures, students will be given additional online tutorials to practice and improve their skills while working on assignments.

Technical skills will be implemented through exercises using various tutorials in Rhinoceros, Illustrator, and Grasshopper in the first part of the course. Conceptual understanding and implications for the design process will be explored through in-class work sessions that require student participation and engagement. There will be lectures and video tutorials that introduce various geometric principles and compositional aspects related to the assignments. During in-class workshop sessions students are expected to develop conceptual understanding and implications for the given design tasks.

All assignments have to be submitted to Canvas. Submissions via email are not accepted.

**Project**

All students will be required to do a project in the second half of the semester. The topics of each projects will be based on a research assignment and develop together by the instructor and students as the semester progresses.

**Handouts/ Tutorials**

All tutorials will be posted on Canvas. Assignments will be handed out in class.

**Course Requirements and Assignments**

Weekly assignments 100 PTS (-10pts for late submissions).

Final project 1000 PTS.

Weekly assignments:Points Grade Description90- 100 A Excellent 80 - 89 B Good 70 - 79 C Satisfactory 60 - 69 D Minimally Passing0 - 59 F FailingFinal project:Points Grade Description900- 1000 A Excellent 800 - 890 B Good 700 - 790 C Satisfactory 600 - 690 D Minimally Passing000 - 590 F Failing

There will be no incompletes awarded without appropriate reason nor without a prior meeting, in person, of the student and the instructor. All assignments must be completed in order to receive a passing grade in the class.

**Literature**

1. Carpo, M. (2013). The digital turn in architecture 1992-2012 (AD reader). Chichester, West Sussex [England]: Wiley.
2. Carpo, M. (2017). The second digital turn: Design beyond intelligence (Writing architecture. Cambridge, Massachusetts: The MIT Press.
3. Haeckel, E., & Universiteitsbibliotheek Utrecht. (1899). Kunstformen der Natur.
4. Payne, A. & ModeLab, Grasshopper Primer, http://grasshopperprimer.com/en/index.html
5. Pottman Helmut, Asperl Andreas, Hofer Michael, & Kilian Axel. (2007). Geometry for Digital Reconstruction. In Architectural Geometry (pp. 1-2). Bentley Institute Press.
6. Schumacher, P. (2011). The autopoiesis of architecture a new framework for architecture. Vol. 1 +2. Chichester: John Wiley & Sons.
7. Schumacher, P., & Schumacher, Patrick. (2016). Parametricism 2.0: Rethinking architecture's agenda for the 21st century (Architectural design, profile no. 240).
8. Spuybroek, L. (2011). Sympathy of things: Ruskin and the ecology of design. Rotterdam] : New York, NY: V2\_Publishing : NAi Publishing ; Available in North, South and Central America through D.A.P./Distributed Art.
9. Spuybroek, L., & Georgia Institute of Technology. College of Architecture. (2011). Textile tectonics (Research & design). Rotterdam: [New York, NY: NAi ; available in North America through D.A.P./Distributed Art.
10. Tedeschi, A. (2014), AAD Algorithms-Aided Design, Parametric strategies using Grasshopper.
11. Thompson, D. (1917). On growth and form. Cambridge [Eng.]: University Press. /.

**Archiving**

In some courses, selected students may be required to submit physical examples of their work or digital examples no later than one week after the end of term, to their instructors or administration for archiving. By enrolling, each student grants a license to reproduce and display his or her work. This is a chance for students to have their work shown online and potentially featured in forthcoming publications.

# Class Schedule

See attached annotated class schedule. Please note: this schedule is subject to periodic revisions over the course of the term. Updated schedules will always be posted on the shared course folder.

# COURSE POLICIES

**Attendance**

Attendance at all class meetings is mandatory and crucial to successful completion of this course. If you do not present your work or participate in class your course grade will be affected. Attendance will be taken at the beginning of each class period and punctual arrival is required. Late arrivals or departures from class will be counted as absences; **more than two unexcused absences or three total absences will be grounds for reduction of your course grade by a full letter grade**. Absences will be excused only for medical or family emergencies documented in writing. Student must contact instructor as soon as possible to inform them of the emergency situation. Failure to do so will potentially result in an unexcused absence. There will be no incompletes awarded without appropriate reason nor without a prior meeting, in person, of the student and the instructor. Grade queries or disputes should be taken up first with one’s section instructor. If they cannot be resolved at that level, they may then be brought to the coordinator’s attention.

Your grade for this course will be determined based upon the quality of the work you produce, your improvement over the course of the semester, completion of required course assignments, quality of class participation, and attendance, attitude and ethical conduct.

Link to GT Attendance Policy - <http://catalog.gatech.edu/rules/4/>

**Grading**

Your grade for this course will be determined based upon the quality of the work you produce, your improvement over the course of the semester, completion of required course assignments, quality of class participation, and attendance, attitude and ethical conduct. Remember, grades are earned by you – not given by your instructor.

* A grade of “F” indicates a failure to meet the course requirements, including attendance, minimum requirements concerning presentation and fulfillment of course requirements. In case of an “F”, the course will need to be repeated.
* A grade of “D” means that you have significant attendance problems, your performance is poor, including failure to meet deadlines, the basic requirements of the course, and/or your project is not plausible.
* A grade of “C” means that you have met the minimum requirements of the course, but your project is plausible, even if substantially undeveloped.
* A grade of “B” means that you have met the basic requirements of the course and that your project is developed to the point where evaluation can be made according to the course criteria.
* A grade of “A” means that your project clearly represents both a clear understanding of course criteria, and a self-motivated exploration beyond the basic course requirements. Projects that receive grades of “A” are exemplary projects in terms of concept, production, and craft.

Evaluation of a student’s performance in each course is the responsibility of the instructor for that course. If the grade is disputed, a student may appeal to the instructor for a review. If, after the review, the student still believes that a grade has been assigned unfairly, the student may submit a written request for a grade appeal to the School Chair. The petition must clearly state the reasons for the appeal. A committee of faculty and students will convene to review the work and make a decision as to whether the grade will stand or be changed. Petitions must be settled and a final grade submitted to the registrar no later than three weeks after the end of the term in which the course was completed. The School Chair will inform the student of the committee’s decision regarding the grade appeal, and their decision is final.

A student may receive a grade of incomplete (I) by requesting permission from the instructor prior to the date of the final examination or presentation. Permission will be granted only under extraordinary circumstances and usually for medical reasons.

# Academic Integrity and Conduct

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. All Georgia Tech students should familiarize themselves with and abide by the Georgia Tech Honor Code: <http://www.catalog.gatech.edu/rules/18/>. Any student suspected of cheating on a quiz or exam or caught plagiarizing will be reported to the Office of Student Integrity.

For expectations of student and instructor conduct more generally, consult section 19 of the catalog listed above, entitled “Code of Conduct,” http://www.catalog.gatech.edu/rules/19/, and section 22, entitled “Student-Faculty Expectations,” at http://www.catalog.gatech.edu/rules/22/.

All persons in the classroom are expected to behave with courtesy towards others and in a way that does not interfere with the regular conduct of the class. Cell phones are to be turned off when students enter the classroom and should remain off for the duration of class; laptop computers are to be used only for taking notes; and students should not engage in private conversations while the instructor or other students are speaking. Anyone who does not adhere to these basic courtesies will be asked to leave.

# Accommodations for Students with Disabilities

Any student with a disability, that may require accommodation, should contact Office of Disability Services at 404-894-2563 or visit <http://disabilityservices.gatech.edu> to make an appointment to discuss his or her special needs and obtain an accommodations letter. He or she should also schedule an appointment to speak with the course instructor.

**Emergencies**

In case of emergency (e.g., fire, accident, or criminal act), please call the Georgia Tech Police at 404-894-2500. Please note that Perry Minyard, IT Support Administrator for the College of Architecture, is also a firefighter and an Emergency Medical Technician (EMT) certified in performing CPR.

**Ownership**

Physical copies of student work submitted to the school to satisfy course requirements—including, but not limited to digital files, papers, drawings, and models—become the property of the school. It is assumed as no obligation to safeguard such materials and may, at its discretion, retain them, return them to the student, or discard them.

# College of Design Facility Rules and Guidelines

Please consult the Georgia Tech Student Handbook regarding the use of facilities and all Institute policies. Aerosol sprays of any kind are strictly banned from the studio and surrounding areas. A new spray painting booth is now in operation in the COA shop, on the ground floor of the East Architecture Building.

Shop Use: All students using shop facilities must first have completed an orientation. Safety first, always! Noise should be kept to a minimum. Music may be listened to only through headphones, including evenings and weekends.

Studio Housekeeping: Students should feel free to organize their space creatively and expressively, but with respect to others around them. Try to prevent clutter from becoming a nuisance, distraction, or a hazard. The cleaning staff makes every effort to determine what is and is not trash, but their job can be made easier if you keep drawings filed and models off of the floor.