

# Ball State University | Spring 2026

## ARCH 598 | Modeling & Structural Analysis – Integrating Computational Design, Structure, AI, and Daylighting

Instructor: Daoru Wang

**Meeting Times:** 11 AM to 12:15 AM, Monday & Wednesday

**Room:** Architecture Building 101

**Office Hours:** Appointment based only.

**Prerequisite:** None

### Course Description

This course introduces computational design methods for architectural modeling, structural analysis, and daylighting simulation using Rhino, Grasshopper, and AI-assisted workflows. Students will develop integrated digital skills to model complex geometries, evaluate structural behavior, and analyze environmental performance through data-driven and performance-based design approaches.

### Course Materials

- Personal computer (**WINDOWS OS ONLY**) capable of running all required software concurrently without significant delays.
- Licensed Rhino 8, Radiance (free), Ladybug & Honeybee (free), V-Ray (trial version is sufficient), SAP2000 (trial version is sufficient)

### Course Structure

This course is divided into 4 sections:

- **Weeks 1-2:** Rhino basics – interface, commands, unit settings, tolerance, annotation, print-to-scale, and surface continuity. Architectural examples like Lego Sculpture and Forest Tower will be discussed.
- **Weeks 3-5:** Parametric modeling with Grasshopper – data trees, types, list operations, and curve attractors. Focus on algorithmic thinking and parametric workflows.
- **Weeks 6-13:** Advanced Rhino – SubD modeling, flow along surfaces, case studies (Mobius strip, Serpentine Pavilion, Leeza SOHO), rendering, and space frames. Students will complete individual modeling and rendering exercises.
- **Weeks 14-15:** Structural analysis and fabrication – SAP2000, Grasshopper data transfer, and environmental analysis with Honeybee and Ladybug.

# Course Calendar for ARC Students

1. [Rhino Interface and Basic Commands + AutoCAD Aliases for Rhino](#) (1/5)
2. [Unit Settings + Absolute Tolerance + Annotation Style + Print to Scale](#) (1/7)
3. [Surface Continuity](#) (1/12)
4. [Lego Sculpture by Zachary Steinman + Forest Tower by Roman Vlasov](#) (1/14)
5. [Flow Along Surface + Grasshopper Interface Basics and Tips](#) (1/21)
6. [Curve Attractor 1](#) (1/26)
7. [Data Tree and Data Types](#) (1/28)
8. [Data Tree and List Operations](#) (2/2)
9. [Curve Attractor 2](#) (2/4)
10. [Rio 2016 Olympic Cauldron](#) (2/9)
11. [SubD Modeling](#) (2/11)
12. [Structural Modeling of the Centre Pompidou-Metz](#) (2/16)
13. [Ribbon House by Roman Vlasov](#) (2/18)
14. [V-Ray for Rhino](#) (2/23)
15. [Architectural Line Drawing + AI](#) (2/25)
16. [Mobius Strip + Möbius Strip Architecture: Diagrid Structural Modeling](#) (3/9)
17. [Mobius Strip Book Shelf](#) (3/11)
18. [Modeling Space Frame Structural Members](#) (3/16)
19. [Space Frame Physical Model Template](#) (3/18)
20. [Parametric Facade](#) (3/23)
21. [Serpentine Pavilion 2016](#) (3/25)
22. [Infinity Airport](#) (3/30)
23. [Leeza SOHO](#) (4/1)
24. [Morpheus Hotel and Resort at City of Dreams](#) (4/6)
25. [Modeling the Cable Structure of Dorton Arena](#) (4/8)
26. [Introduction to Structural Analysis: Shear and Moment Diagram](#) (4/13)
27. [Introduction to SAP2000](#) (4/15)
28. [Installation of Structural Analysis Plugin + Data Transfer from Grasshopper to SAP2000](#) (4/20)
29. [Introduction to Daylighting Analysis](#) (4/22)
30. [Honeybee and Ladybug](#) (4/27)

# ASSIGNMENTS

Submission of all course assignments is expected, and all work is due as scheduled (by 11:59 pm on the due date). Any assignment that is not submitted on time will be accepted for up to one week for a 15% penalty. Consistently submitting late work will seriously affect your course grade; on the other hand, submitting one or two assignments a bit late is not a big deal if there is a need to juggle conflicting time demands. Patterns of timeliness are more important than a single instance. No work of any kind will be accepted after 5:00 pm on the university's scheduled last day of class unless by written, prearranged agreement.

# GRADING

## FINAL LETTER GRADE SCALE

Grade	Score Range (%)
A	93 - 100
A-	90 - 93
B+	87 - 90
B	83 - 87
B-	80 - 83
C+	77 - 80
C	73 - 77
C-	70 - 73
D+	67 - 70
D	63 - 67
D-	60 - 63

## Grade Components

Final grades will be based on the following percentages:

Component	Weight
Week 1	6%
Week 2	6%
Week 3	3%
Week 4	6%
Week 5	6%
Week 6	6%
Week 7	6%
Week 8	6%
Week 9	6%
Week 10	6%
Week 11	6%
Week 12	6%
Week 13	6%
Week 14	6%
Week 15	6%
Week 16	3%
Participation	10%

# COURSE POLICIES

## Participation Policy

- This course is designed with weekly activities, discussions, and other forms of regular collaboration and communication.
- It is recommended that you log into your course 3 to 4 times a week and check your official Ball State email account daily to view announcements and prepare for class.
- Complete all assignments, tasks, and readings by the assigned due date.
- If unforeseen and uncontrollable circumstances make it impossible for you to fully participate in course activities as scheduled, such a situation must be brought to the instructor's attention immediately. Delayed requests for consideration of such events will not be accepted. Any request for a deviation from the published due dates must be made in a timely manner and be agreed to in writing. A grade of 'I' (incomplete) will only be considered under the conditions outlined under university policies – i.e., unavoidable, extraordinary circumstances beyond the control of the student.

## Attendance Policy

- Class attendance is mandatory. Tardiness and early leave are counted as half an absence.
- Excused absences are those for medical illness, funeral, jury duty, observance of religious holidays, and military absences. For an absence to be excused, the students must submit proper documentation.
- More than two (2) unexcused absences will result in an automatic reduction of your final grade by a half grade (e.g. a B+ will be a B-). It is your responsibility to keep a track of your absence record. You will not be notified of this record; however, you will get an update upon request through email. The grade reduction will occur at the end of the semester before grades are submitted and not when they occur. As such, you will not see these grades in the canvas grade book.

## Grading Policy

Appropriate evaluation of your academic performance is an integral part of your learning experience. Grades will be determined by the instructor in accordance with university guidelines. For information concerning grade appeals, consult the Ball State website.

## Diversity Statement

Ball State University aspires to be a university that attracts and retains a diverse faculty, staff and student body. We are committed to ensuring that all members of the campus community are welcome through our practice of valuing the various experiences and world views of those we serve. We promote a culture of respect and civil discourse as evident in our Beneficence Pledge and through university resources found at: [bsu.edu/campuslife/multiculturalcenter/bias-incident-reporting](https://www.bsu.edu/campuslife/multiculturalcenter/bias-incident-reporting).

# Architecture Department and University Policies

## Architecture Department Studio Culture Policy

The Architecture Department establishes guidance for a positive and respectful learning environment in which the students, faculty, staff and administration within the Department are able to reach their full academic potential. The goal for the learning environment of the Department is a highly collaborative one; emphasizing the need for group and individual growth within each scholar of the Department. This Policy outlines the criteria in order to foster this environment:

[https://www.bsu.edu/-/media/www/departamentalcontent/architecture/pdf/architecture%20pdfs/bsu\\_architecture\\_studio\\_culture\\_policy\\_24apr18.pdf](https://www.bsu.edu/-/media/www/departamentalcontent/architecture/pdf/architecture%20pdfs/bsu_architecture_studio_culture_policy_24apr18.pdf)

## University Health

BSU Health Plans can be found at:

<https://www.bsu.edu/about/administrativeoffices/health-promotion-and-advocacy>

In the event of a health emergency, it is expected that you comply with any and all BSU health response requirements. Responses may include a requirement to wear a face mask while inside campus buildings; social distancing requirements; and/or regulated access to campus buildings. If you are unable to wear a face mask while requirements stand, contact the Office of Disability Services to request an accommodation.

## University Code of Student Rights and Responsibilities

Students are expected to read, understand, and adhere to these community standards.

<https://www.bsu.edu/about/administrativeoffices/studentrights/policiesandprocedures/studentcode>

## University Statement on the Importance of Diversity and Inclusion

Ball State University aspires to be a university that attracts and retains a diverse faculty, staff, and student body. We are committed to ensuring that all members of the community are welcome, through valuing the various experiences and worldviews represented at Ball State and among those we serve. We promote a culture of respect and civil discourse as expressed in our Beneficence Pledge and through university resources found here.

## University Special Needs Statement

If you need course adaptations or accommodations because of a disability, please contact our office as soon as possible. Ball State's Disability Services office coordinates services for students with disabilities; documentation of a disability needs to be on file in that office before any accommodations can be provided. Disability Services can be contacted at 765-285-5293 or [dsd@bsu.edu](mailto:dsd@bsu.edu).

## Faculty Disclosure Statement

Instructors at BSU are invested in your well-being and your future. If you are experiencing any life issues, please feel free to approach a professor for advice but be aware that all BSU employees are required by BSU regulations, Indiana State laws, and/or US laws to report various instances of (including but not limited to) child abuse, sexual harassment, abuse, intentions of self-harm, etc.

## **FERPA and Privacy**

As a student, your educational records are considered confidential. Under FERPA (Family Educational Rights and Privacy Act), your records are confidential and protected. Under most circumstances, your records will not be released without your written and signed consent. However, some directory information may be released to third parties without your prior consent unless a written request to restrict this is on file. You can learn more about student rights to privacy by reading Ball State's FERPA and Privacy and Protect.