Architectural and environmental generative computational design, the use of inverted and hybrid teaching pedagogies in design technical education settings, and a project to develop screen cast learning materials for ARCH250

Study sabbatical Report

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Abstract

This report details the activities of a sabbatical completed by Professor Sardinas during the academic school year 2018 - 2019. Professor Sardinas completed 5 courses and received certifications in generative and computational modeling, flipped learning, and skills and pedagogy for online teaching (SPOT). Additionally Professor Sardinas completed two projects including 10 screencast educational videos in generative computational design and 61 screencast videos in global historic architecture. The 10 screencasts in generative and computational modeling are available to department students in an online format. The 61 screencast videos in global historic architecture will be incorporated into the architecture program course ARCH250 "World architecture from prehistory until the middle ages".

Statement of purpose

The purpose of this sabbatical is to further my subject matter expertise in two technical areas related to architectural education as well as completing a screencast production project for an architecture program course.

One of these areas is the study and subsequent application of computational design and generative modeling. Specifically as they relate to architectural, environmental and sustainable design. The primary focus is in the application of these high technology tools and processes to iterative design exploration.

A second technical area is in applying the growing methods of online, hybrid and inverted teaching pedagogies in the field of architecture. This discipline inherently requires that students participate in studio/lab settings that are difficult to achieve in those pedagogical learning environments. My findings will assist in developing strategies to increase student engagement and success in our courses.

The final component of this sabbatical is the completion of a project to produce screencast videos in the areas of computational and generative design as well as global historic architecture. The technical computational design screencasts will be available to students department wide in an online format. The screencasts on global historical architecture will focus on the period from prehistory until the middle ages and will be made available to faculty teaching the ARCH250 course.

Presentation of sabbatical activities

Part 1

Architectural and environmental generative computational design

The first part of my sabbatical consisted of taking a course in generative computational design, participating in a self-study component related to this subject and completing a screen cast project. Below are my thoughts and commentary.

Iterative process is a core and required practice in architecture, design and studio arts. In its common form, it requires the creation of evolving instances of a design, form or solution. In the Profession, these are called design alternatives. The process can be intuitive or heuristic but in either case, it requires repeatedly creating design alternatives in the form of drawings and models. Generative computational design is a relatively new paradigm where the designer develops an algorithm with variable inputs that can potentially produce iterations more rapidly. A different use of this type of computational algorithm can be to deconstruct a design into constituent parts for fabrication.

One of the leading tools for developing these design algorithms is the Grasshopper 3D software. It is an internal part of a design modeling software platform called Rhinoceros 3D. The MtSAC Architecture program has been using this design modeler for almost a decade. It is standard at many if not all of the transfer institutions for architecture in the state. Grasshopper 3D provides a graphic programing interface with hundreds of components available to the user. The components generally take the form of parameters or operators which are linked by a series of graphic wires through which the algorithm flows.
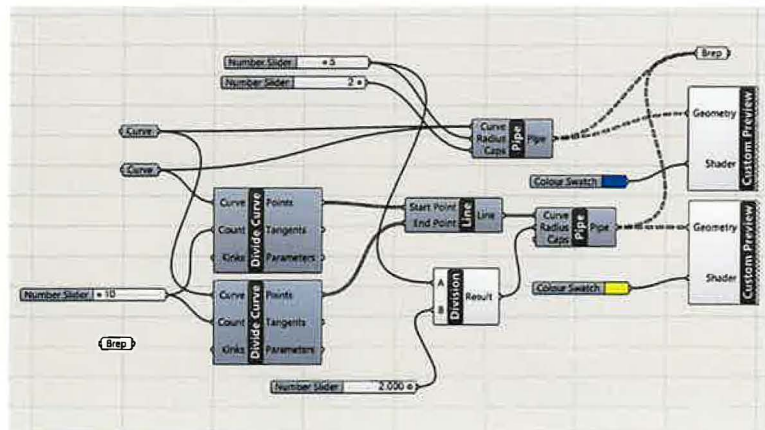

Image: example of components and wires

This grouping of a set of components into a usable algorithm is called a "definition". The output of the definition shown on the preceding page is a 3 dimensional model in the Rhinoceros software as is shown in the image to the right.

The second image on this page is of 3 simple iterations of the design with varying densities of cross tubing.
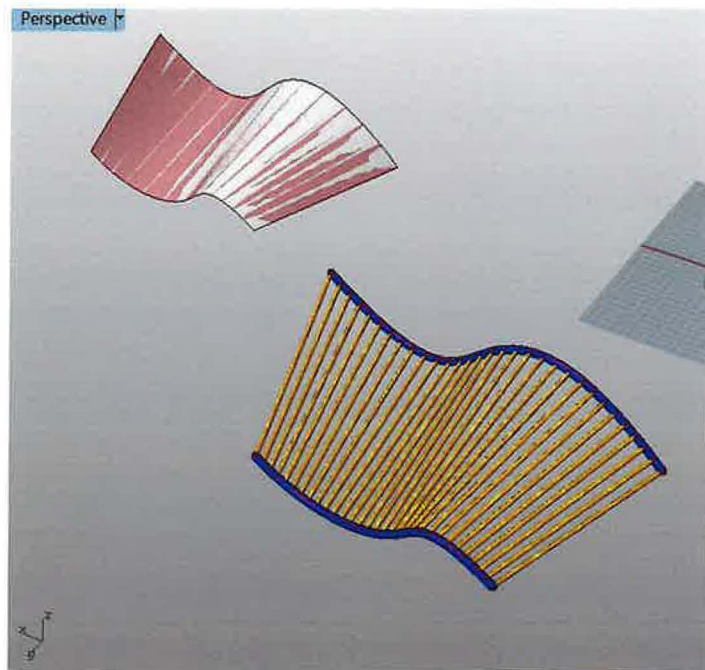

Image: Sample model output of the definition

While this is a very simplistic example, it serves to quickly expose a student to the power of iteration with grasshopper. The 3 iterations where produced automatically in seconds simply by changing the input value from 30 to 20 and 10. To build these iterations manually would have taken exponentially more time. Of further note is the fact that only 1 variable was adjusted while many more could have been explored

Image: Example of 3 iterations

I completed the Mcneel level 1 Grasshopper certification as part of this sabbatical. It was a thorough and intensive exploration of the most recent version of Grasshopper 3D. The content of this course provided me with much insight and practical experience. Based on what I learned, I designed a brief learning experience and developed 10 introductory screencast videos. These 10 tutorials act as a quick introduction to setting up the program and beginning to use the interface. The tutorials are intended to be the beginning point for a broader set of updated application tutorials that will be an inherent part of one of our upper level classes. A second use for these initial beginner screencast tutorials will be to pre-expose our more entry level students to this wonderful tool and method of designing without the extensive involvement required by the full course.

The Mcneel level 1 Grasshopper course was 4 intensive days of content and as such cannot be incorporated into this 10 video project. The information, skills and knowledge gained from taking the course will be incorporated into the ARCH222 course to be taught in the spring of 2020. The course was taught in a multi-disciplinary context and fashion. Application exercises focused on a wide range of topics including jewelry design, furniture design, architecture, engineering design and fabrication. I am planning to meet with the instructor for the ARCH222 course and contextualize the courses specifically for architectural studies appropriate to our students

The images shown earlier in this discussion were taken from the exercise explored in the 10 tutorial videos. On the following page is the 3C media webpage with the tutorial videos. The videos will be accessible to MtSAC Students through 3CMedia.com and will also be incorporated into a tutorial section of our introductory architecture course ARCH101 design level 1.

	Title	Date		Status	Options
☐	001 Grasshopper interface preferences settings.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	002 Grasshopper interface screen and menus.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	003 Intro to components- perams-functions and wires.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	004 Using panels and groups.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	005 Understanding and Incorporating numeric variable sliders.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	006 Referencing geometry from Rhino3d into the grasshopper interface.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	007 Mathmatical subdivision of line goemetry.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	008 Using the Pipe, Cap, Cover function to solidify vector geometry.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	009 Utilizing color in generative iteration.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	010 Solidifying generative models utilizing the Grasshopper -Bake- Function.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete

"Ladybug tools" Algorithmic and parametric modeling for environmental analysis

In addition to the formalized training of the Mcneel grasshopper course, I also did additional self-study and training in an environmental analysis application for grasshopper called the Ladybug Tools. These additional parametric functions operate within grasshopper, which in turn runs inside of rhinoceros 3D. Some of the key capabilities of this application are:

1. Environmental Analysis
2. Analyze and Visualize Weather Data
3. Generate Wind Roses
4. Psychometric analysis
5. Average Radiation
6. Ray-tracing
7. View Rose
8. Shadow Study
9. Generate Sun Path studies
10. Perform Outdoor Comfort Study
11. Perform Radiation Benefit Study

It is important to note that architecture students at MtSAC begin designing and modeling in Rhino in their first semester in our program. The information generated by the Ladybug 3D Tools is directly related to the digital environment they are designing in.

On the following pages are a few examples of the processes and capabilities of the Ladybug Tools.

Temperature analysis and visualization

Understanding the weather is very different than understanding climate. The Weather is what we experience on a daily basis. Climate is the amalgam of yearly weather ranges and conditions compiled and averaged over many years. Most of our students understand the typical weather ranges were they live. However, they often do not have a clear picture of the broader climate and how it impacts what they are designing. Students also struggle to clearly appreciate how different yearly climate profile can be just in the microclimates of our region. One way to gain an appreciation of this is to relate yearly temperatures to human thermal comfort as well as identifying what time periods are too hot and which are too cold. The top bar graph on the left in the image below is a Ladybug visualization of yearly temperature ranges. In this example we have red being too hot, blue being too cold and yellow falling within the parameters of typical human thermal comfort.
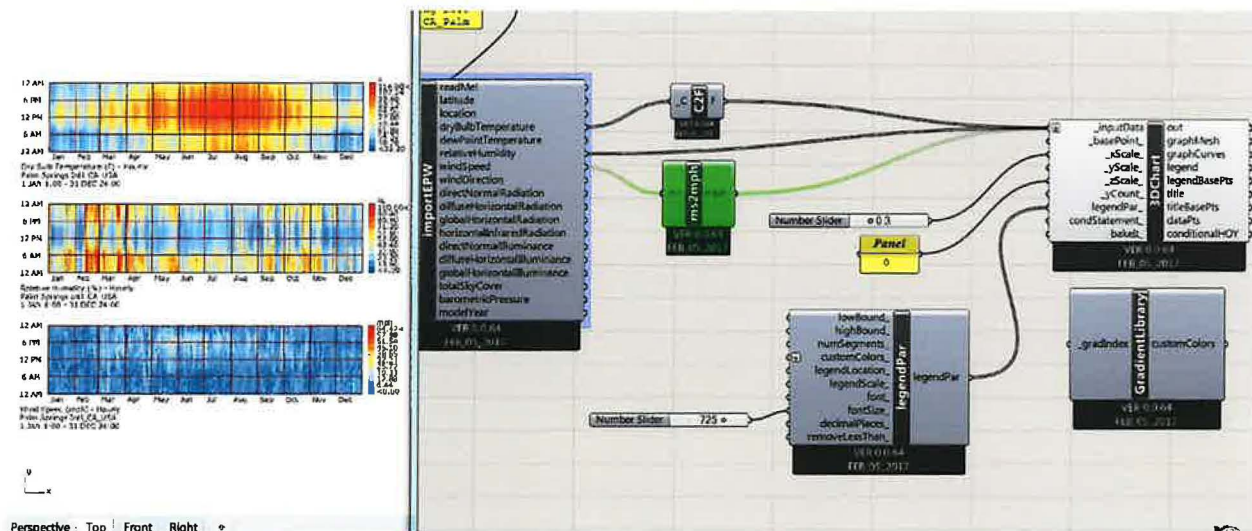

All of the parameters (time period, temperature ranges, color choices, comfort range etc.) are adjustable and customizable within the definition shown on the right hand side of the image

The graphs can also be represented as 3 dimensional models. This can be particularly helpful in a student's ability to compare 2 southern California microclimates that are only about 30 minutes from each other. The first graphic to the right is of Los Angeles and the second is of Claremont. These visualizations help a student to relate one climate they know to another they may not be familiar with.

The information can be combined with other tools in the Ladybug suite to inform decisions about potential shading strategies, the amount of glazed openings, the orientation of those openings, the inclusion of exposed thermal mass elements and potential locations for those mass elements etc.

These representational graphics synthesize several types of information and paint a much clearer picture in student's minds than merely looking at a chart of numbers.
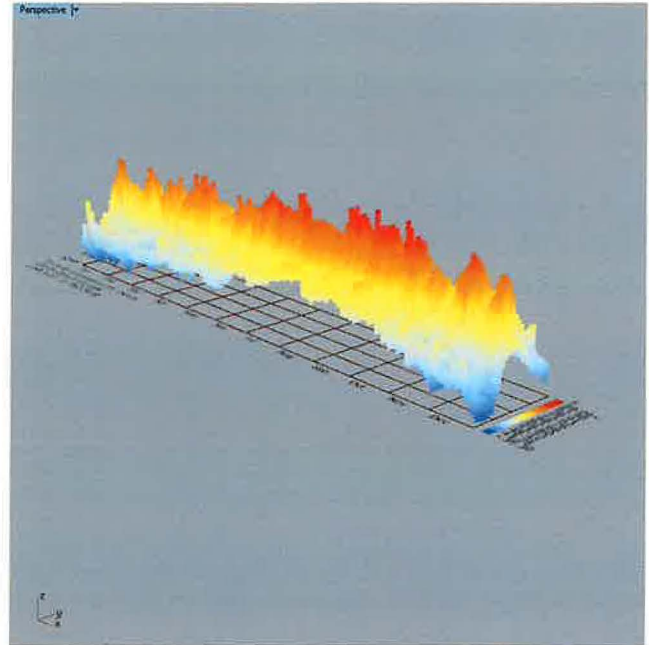

Los Angeles California thermal graph
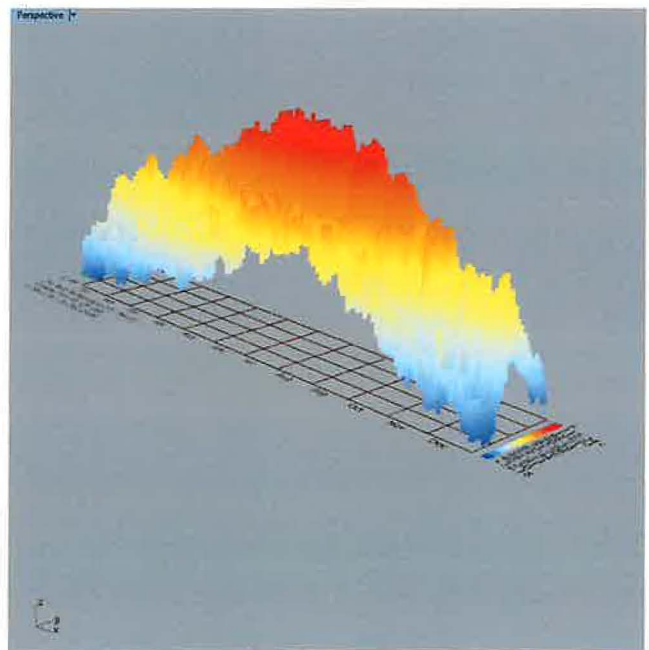
Claremont California thermal graph

Another tool in the Ladybug tools that will be very helpful to MtSAC architecture students is the Sun path components and 3 dimensional model. Students often do not understand why winter days in the northern hemisphere are shorter than summer days. Some are not aware of the quantifiable difference between the summer solstice and the winter solstice.
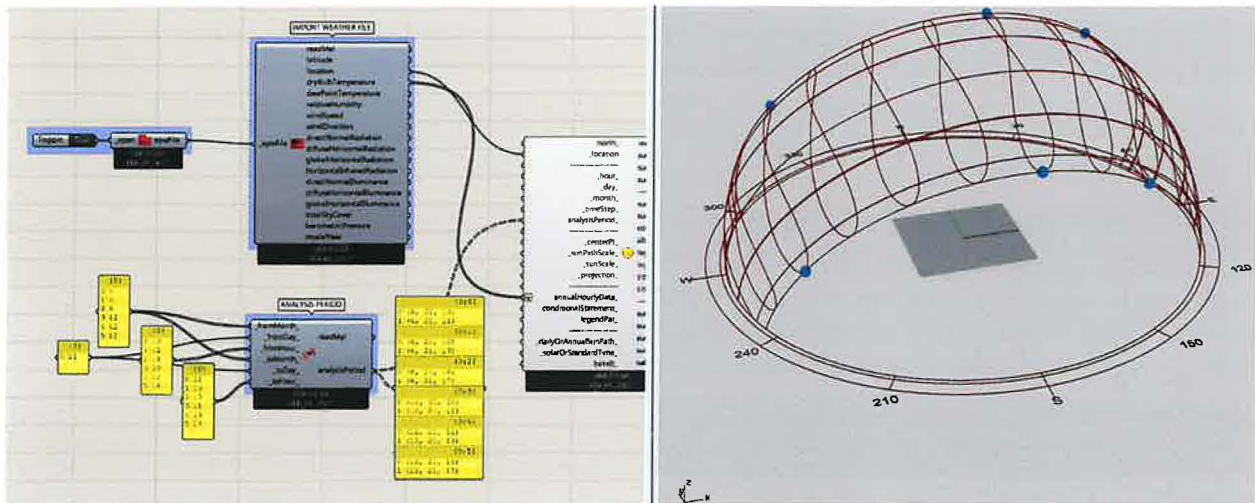
Ladybug sun path components and definition

This tool can help them visualize the shorter and lower path of the sun in winter as compared to the longer path and higher path in summer as well as all of the time periods in between.
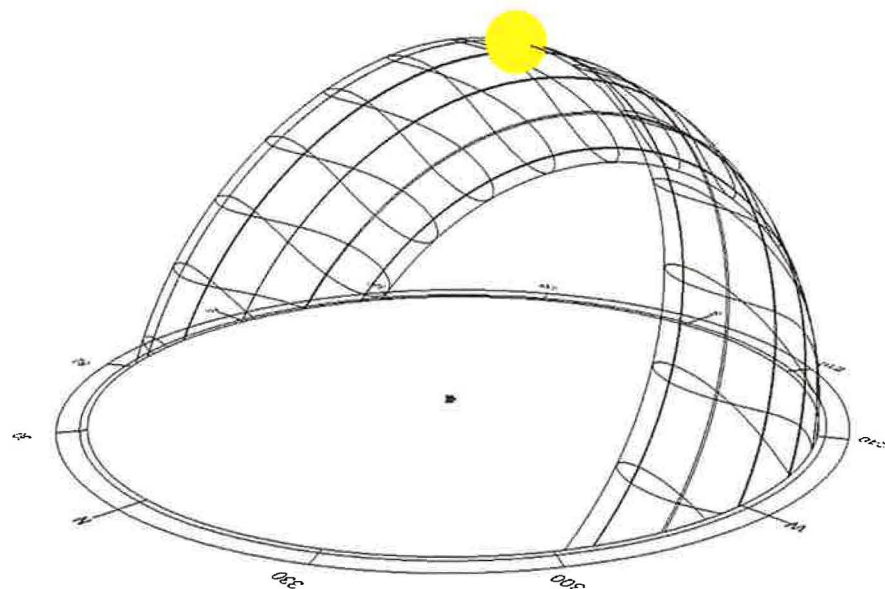

It also allows them to place their design model at the center of the sky dome sun path to analyze the

impacts of the lower sun angle in the winter, the higher angle in the summer as well as the impossibility of shading the low angle eastern-western sunrise-sunset periods in relation to their design and window placement.

The sun path tool can be scaled to fit around any size building or site. In the image below we see a large area of land with buildings sitting under the sun path sky dome. The Image also illustrates the ability to link the temperature analysis to every hour over the course of a full year thereby correlating the overheated, comfortable and cold periods with the building design, potential window placements and overhangs.
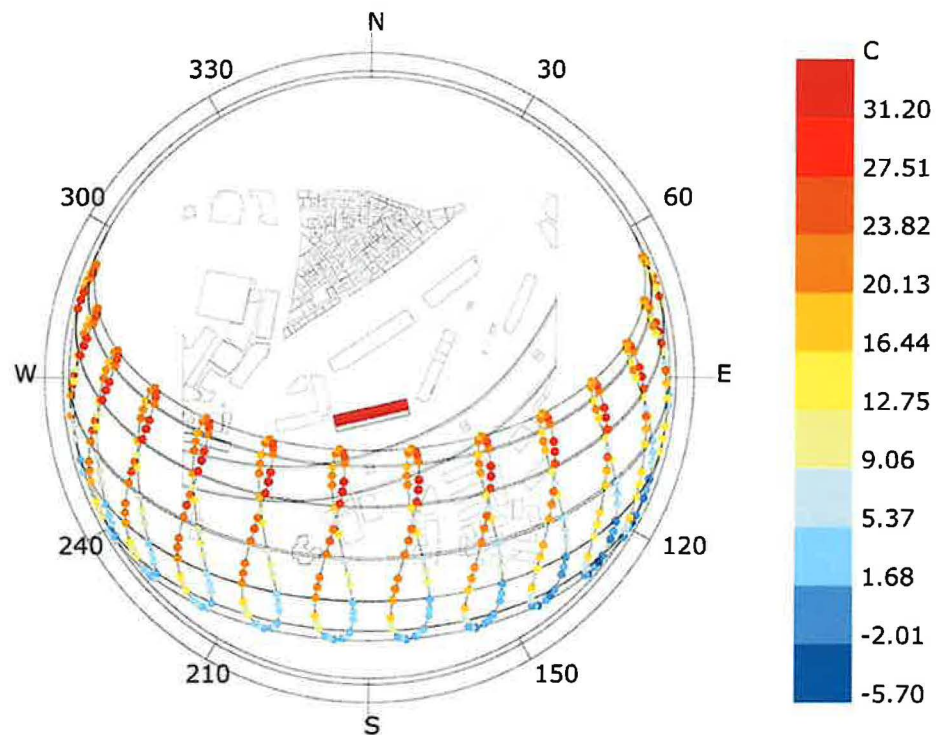
Utilizing the sun path diagrammatic graphic can give students a clear picture of why south facing windows in the northern hemisphere are a preferred solution for energy efficient design. By placing windows on the south, it is clear to see that direct solar gain in the summer is relatively simple to block with an appropriately sized and placed overhang. Likewise, one can also see how the lower southern sun angle in the winter can be used to allow passive solar heating of rooms and spaces adjacent to the south facing windows. The color-coded sun dots in the graphic are plotted hourly over the course of key times of the year and show the cooler and warmer periods thereby giving the designer visual prompts as to when to let the sun in verses keeping it out.

Wind is yet another factor than can be plotted and analyzed graphically using the ladybug tools. Both 2 and 3 dimensional plots can be generated. As with the solar path plot, one of the distinct advantages of these plots is the ability to see the 3 dimensional model in direct relation to the graphic data.

The 3 dimensional plotted graphic diagram can also be specified to show wind speed variations dependent on distance above grade if the ECW data file is combined with digital model based geographical and terrain information.
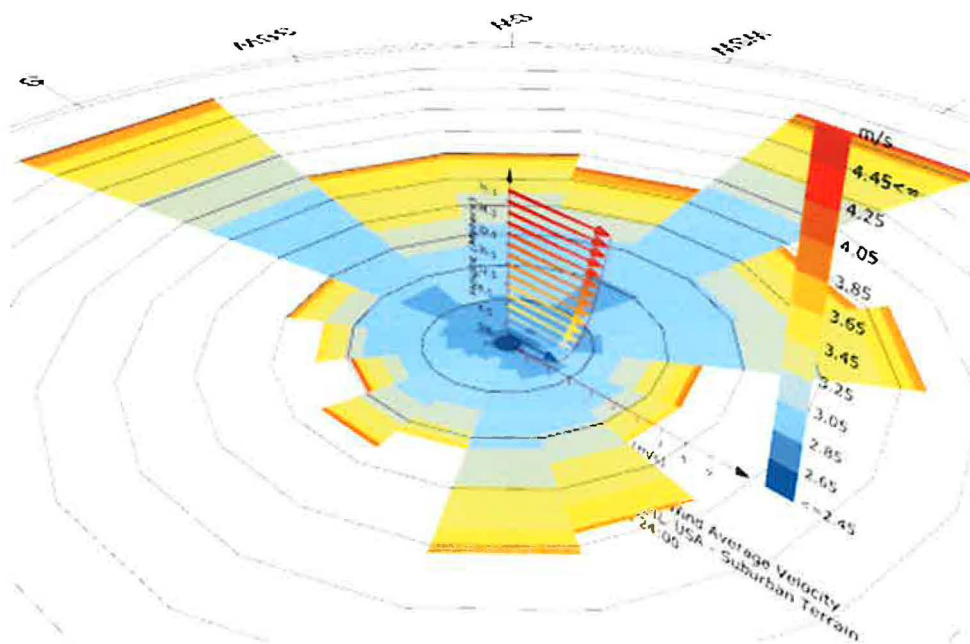

3 dimensional wind rose plot

The wind speed data can be sifted and manipulated to display times of year when it could be advantageous to cool the interior of a structure passively using the natural breeze. It can also distinguish when there are periods when there is wind but the outside air temperature is higher than the desired comfort zone for the interior. The

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data can be further used to identify times of year when the structure can be flushed overnight using mechanical ventilation to cool the internal mass and allow the building to begin warm days at a cooler start point than it would otherwise have if it remained unventilated. Also like the solar sun path plot, the wind diagram can be linked to historic temperature data to produce a plot that shows outside air temperatures in relation to wind speed and compass direction

Wind-Rose

Wind-Rose
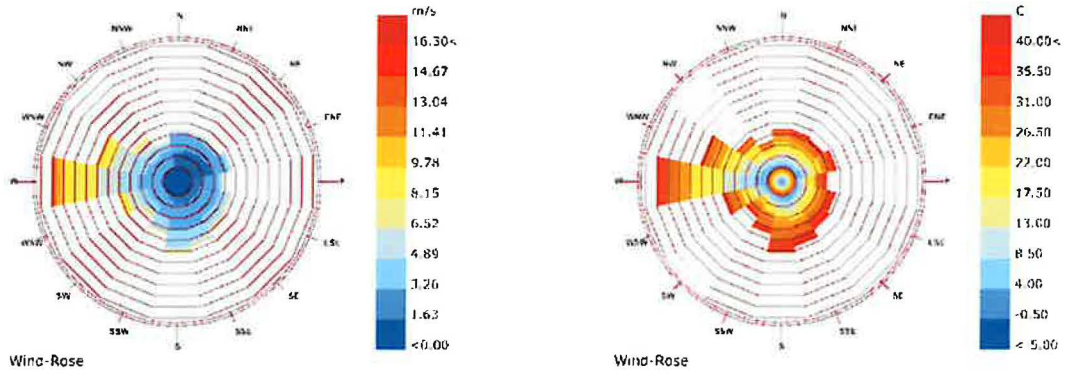
Ladybug additionally contains functions that produce psychometric charts. While these are available in other programs like "Climate Consultant", it is useful that the information is in a consistent graphic format and available within the design modeler.
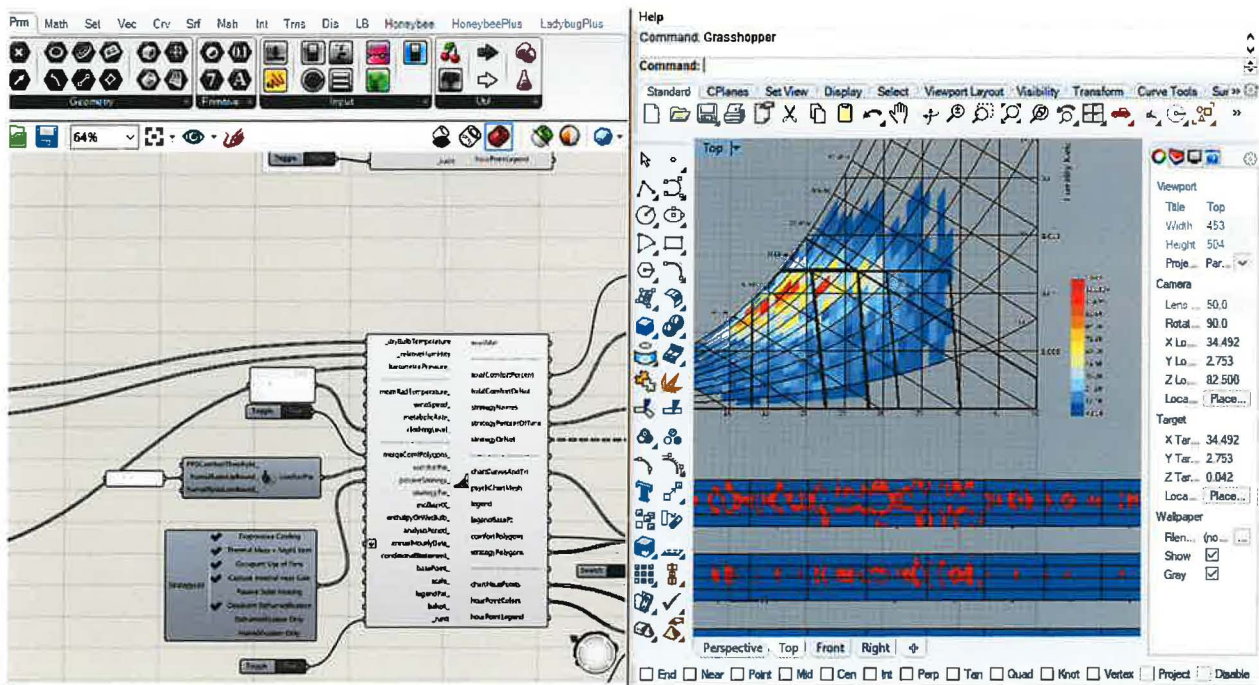
This allows for quick reference during the design process by not requiring the student to leave one program to go to another then back again.

These features and capabilities will be extremely useful in our capstone course ARCH202 Design IV - Sustainable Design. The focus of this course is the synthesis of formal and esthetic design with the mandate to build in an energy efficient and sustainable fashion.

Part 2

Inverted and hybrid teaching pedagogies
in design technical education settings

The second part of my sabbatical consisted of taking several courses in distance learning, as well as achieving a level 1 certification in flipped learning. The courses for this portion are as follows:.

1. Introduction to Online Learning (UCSD, EDUC-40989).
2. Foundations of Curriculum Design and Evaluation (UCSD, EDUC-40990)
3. Flipped Learning 3.0 Certification Level I (FL Global)
4. Skills and Pedagogy for Online Teaching (MtSAC POD)

There is additional information about the courses in a different section found later in this report. I enrolled in these courses to expand my knowledge of alternative teaching methods and how they may be applied to the programs of our department. I learned abundantly from the courses, but some key ideas that stood out to me are listed here.

- Specificity, clarity and sequencing is crucial to good curriculum development.
- Learning contracts can help students to become invested in succeeding in the course and in their education.
- Peer evaluation of curriculum is essential to having a well-rounded and complete content.
- Incorporating rubrics helps students understand the expectations of an assignment or project as well as how it will be evaluated and graded.
- Structure and speed of presentation in distance learning setting is crucial to student success.
- Engaging students and creating community and interaction is crucial to their success in distance learning setting.

- Ease of navigation needs to be incorporated to help students complete the portions of the course.
- Finding the right balance of redundancy and repetition is crucial in distance learning environments.
- Information needs to be "chunked" or partitioned into smaller segments to keep students from feeling overwhelmed or lost.
- Digital objects such as screencasts and video presentations need to be kept relatively short. For the community college level a period of 8 to 12 minutes is considered by some to be optimal.
- Frequent informal assessment, (potentially ungraded) will help students to gauge their level of understanding.
- Frequent feedback helps student engagement.
- Review any content not specifically developed by you completely before incorporating it into a course.
- Have peers and potentially former students review and comment of the content you are developing.
- Integrate activities between digital lessons. Examples include quizzes, worksheets, and online searches for content or images.
- Verify screencasts and video presentations have high quality audio and are clearly and completely understandable.
- Add humor, anecdotes or personal experience during screencasts and video presentations.
- Actively and graphically annotate videos and screencasts to improve clarity and student engagement.
- Consider adding segments of picture in picture to link yourself as the teacher to the learning experience. This helps to create a personal connection with the student that is often impaired in distance learning settings
- Avoid presentations composed of large portions of written text. Instead use itemized lists and images and use the textual information as a speaking prompt for the slide
- Incorporate prompts for students to take notes

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- Incorporate a lesson on how to take notes. In this lesson set yourself up as the student.
- Consider setting digital lessons so there are two presenters. Possibilities include interview settings, discussions between two parties of modeling student teacher in the lesson.

Reflecting on the courses, I concluded that alternative forms of teaching within the architecture program could fall into 3 categories. The first was exclusive online implementation, a second was a hybrid approach and the third was a flipped or inverted teaching model.

This section contains a matrix on page 22 summarizing an evaluation of the MtSAC architecture program courses. Our program offers 20 distinct courses. I evaluated each of them looking for their potential conversion to alternate teaching methods. Elements considered included

1. Lecture lab structure,
2. Need for specialized equipment not readily available to the average student,
3. Need for specialized facilities or spaces
4. Pedagogical approach typically used in the course.

At the bottom of the matrix is a legend explaining the applicability to conversion.

Understanding how architecture is taught is crucial in evaluating the degree and applicability of distance or alternative learning methodologies to courses in this discipline. Before examining the breakdown of courses in the matrix, it is important to look at common impediments to placing architecture courses into a distance learning environment.

The use of these teaching pedagogies in design technical education settings is challenging for many of our courses because of the studio based activities inherently associated with this type of technical education. Studio environment and its related activities is core to architectural education in the United States and most developed

countries of the world. In its traditional form, it entails the physical and digital creation of designs in a collaborative space where students are expected to engage with one another in an almost constant basis. Most architectural studio environments are also shop like in that they often contain a plethora of "maker" tools and technologies like CNC robotic routing/cutting machines, high intensity laser cutting machines, 3D printers as well as more common shop machines and hand tools. The use of these specialized hands-on tools and equipment as well as the expensive nature of task appropriate sophisticated computers/software create impediments to teaching these subjects in a distance learning format. This is also substantially impacted at the community college level by the nature of our demographic where many of our students come from financially disadvantaged backgrounds and often have to work to help support their home and families. This is a very different setting than most of the public and private professional schools of architecture in California where student admission is contingent on having expensive laptops and software before they are admitted.

The majority of our courses in the architecture program meet twice weekly for 3 hours and 10 minutes. A few meet once weekly also for 3 hours and 10 minutes. One obvious method of hybridizing the applicable courses would be to move 50% of the content into an online format. A first glace one might move as much of the lecture component as possible into an online format and allow lab time to be completed at school.

While the scenario above seems like an obvious approach, it is in reality much harder to achieve in our discipline. Most days we lecture or demonstrate for a brief time (20-45 minutes) after which students apply what was covered to the creation of digital or physical models, as well as drawings, sketches or written assignments, after which we repeat the sequence. While the students are working the faculty member works with them in an individual or group setting to asses and foster comprehension and mastery. In some cases the students and faculty move from the studio space to a computer lab or to a shop room then come back into to the classroom. Because of this the simplified 50/50 split is not a good fit. To make the hybridization of one of these courses functional the course and activities would have to be substantially redesigned to enable

students to do some of the simpler "maker" tasks at home. They would then complete the more intensive applications at MtSAC.

Course evaluation for suggested alternate teaching methodologies

ARCH99	Special Projects in Environmental Design	5,*
ARCH101	Design I - Elements of Design	4,5
ARCH102	Design II - Architectural Design	4,5
ARCH121	CADD and Digital Design Media Level I	5
ARCH122	Architectural Presentations	5
ARCH141	Design Drawing and Communication	5
ARCH142	Architectural Materials and Specifications	2,3
ARCH145	Building and Zoning Codes	1,2,3
ARCH146	Architectural Drawings and Fabrications	5
ARCH147	Architectural CAD and BIM	5
ARCH180	Science Concepts for Sustainable Design and Env. Cntrl	2,3
ARCH201	Design III - Environmental Design	4,5
ARCH202	Design IV - Sustainable Design Advanced Project	4,5
ARCH221	Architectural Rendering and Illustration	5
ARCH222	Advanced Digital Media, Generative, & Algorithmic Design & Illust.	5
ARCH247	Architectural CAD Working Drawings	5
ARCH250	World Architecture: Prehistory to the Middle Ages	1,2,3
ARCH251	World Architecture: Renaissance through the Contemporary Era	1.2.3
ARCH280	Structural Design Level I	1,2,3
ARCH290	Architectural Work Experience	5
		0

Key legend

1   Candidate for online course
2   Candidate for hybrid course
3   Candidate flor flipped class
4   Possibility of some amount of flipped content
5   Primarily face to face only
*   Dependent on content

We have 20 distinct courses offered in our architecture program;

7 of those (ARCH 121,122, 221, 222, 146, 147, 247) require the use of highly specialized computers, software, hardware, facilities or tooling thereby making them poor candidates for alternate forms of instruction.

The 4 design studios (ARCH101,102,201,202,) require a substantial amount of individual face to face critique with the students including intermittent demonstration application cycles throughout each class period. A portion of these courses could be flipped in such a way that some learning media could be used as pre knowledge for the remainder of the course, but this is limited.

We also have a course in manual drawing and graphic communication (ARCH141) that requires drafting boards and parallel bars that are cost prohibitive for students to purchase. The content of this course also requires almost constant interaction between faculty and students thereby making it unsuitable for alternate teaching methods.

The special topics course, ARCH99 and the work experience course ARCH290 by their nature do not lend themselves to alternative teaching methods

Finally, 6 of our courses can potentially be taught in one or more of the alternative methods. These include ARCH 142, 145, 180, 280, 250, 251.

The two world architecture courses, ARCH250 and 251 could be adjusted to online, hybrid or flipped methods of instruction, The lab component of these courses would require re-design so that students could produce the projects at home and submit them digitally. Both courses would also require the elimination of field trips if the class was moved to an exclusively online format.

In the 2017-2018 academic year, I created a new course for our program, ARCH280 Structural Design Level 1. This is a structural design course for architecture majors. Its content aligns with the courses offered in university level architecture programs. It was approved during the time of this sabbatical and will be offered for the first time in the fall of the 2019-2020 academic year. This course has good potential to

be moved to an online or hybrid setting. Activities for this course can be designed or adjusted so they can be completed outside of specialized teaching spaces without direct supervision of a faculty member. By coupling the online course with the use of a public Maker Space students could potentially complete the course in a fully online format.

A second course also developed at the same time as the structures course is ARCH180, Science Concepts for Sustainable Design and Environmental Control. In its current state this course could also move to an online setting. However, because of new requirements from our transfer institution partners, we will need to add a lab component. The content of the lab portion of this course will require the use of temperature and humidity sensors, digital data loggers and other fairly sophisticated equipment. Once this occurs, it would be impossible for students to replicate the lab activities on their own and as such prohibit moving it to an exclusively online format. Alternatively, it does have the potential to be taught as a hybrid course where the lecture content is structured for online delivery and the student comes to campus to complete the lab portion. There is also the possibility of uncoupling the lab from the lecture for students who may not require the future activity portion of the course.

ARCH145, Building and Zoning Codes is currently a lecture only course. Because of this it could be placed into a distance learning environment. One caveat is a request by our advisory committee to add a lab application component to the course. This would require careful design of the lab topics and activities so they could be completed by students at home. Alternatively the proposed lab component could be introduced into a hybrid version of the course.

Finally, the ARCH142 Architectural Materials and Specifications could be taught in a hybrid format. The lab component of this course has students physically working with construction materials. They build portions of architectural building assemblies to better understand what is covered in the lecture component. For this course, the lecture component would be online and the related construction activities would be completed in a lab setting in the presence of the faculty member teaching the course.

In conclusion, I feel that a key advantage of distance learning is the flexibility it provides to students. It allows them to schedule their educational time around work and

family life rather than an academic schedule. In some cases, this may be the only way for many students to complete courses and attain a certificate or degree. It is important to do what we can to help our students succeed. This issue is closely tied to the current concerns over equity in higher education. Students with financial disadvantages are most often impacted by having to work less desirable time periods and often have many family responsibilities. They, along with others would benefit from a more flexible education schedule.

Part 3

Production of screencast educational videos

about global historic architecture

The third portion of my sabbatical was a project to produce materials that could be used in a flipped or online section of our ARCH250 World Architecture from Prehistory until the middle ages. One of the most time consuming aspects of developing a course like this is the design and production of the video screencasts for the course. The original intent for this portion of my sabbatical included the development of 32 screencast videos. As my studies progressed, I rethought and adjusted the content of my proposal. Instead of the proposed 32 screencasts, 61 were produced. The topic groupings became more chapter like based on the particular civilization or architectural period being discussed. A few of the originally proposed screencasts were deemed to be more appropriate in a face to face setting where students could work with the instructor and other students. The produced screencast videos were uploaded to the California Community College affiliate site 3CMedia.com. They were captioned and placed in an accessible location for students and faculty. At the end of this discussion is a graphic list of the videos uploaded to 3CMedia.com.

In addition to the screencasts, I also developed exercises to help students better understand some of the concepts of the ARCH250 course. An example of these exercises is the self-measurement project. One of the ways we understand the world around us is by the scale of the spaces and objects in our environment. In simple terms, we understand things in our environment by how big they are in relation to ourselves. The exercise requires students to photograph themselves in a fashion that flattens perspective distortion. They do this by standing against a white or neutral contrasting background. They pose with their arms outstretched to their sides similar to Leonardo da Vinci's Renaissance man. A second student takes the photograph from as far away as possible zooming in to allow the subject student to fill the frame. The camera is placed on a tripod and the lens is set level with the subject student's mid-point in height. Pairs of students assist each other during this process. Each student

then prints their image and delineates dimension of various key body dimensions. Once the exercise is complete, each student uses their body to measure the approximate length, width, and height of rooms and other objects. The goal of this this is that they relate the size of things back to their own body.

The next part of the exercise requires the student to trace over the image of themselves to create a simple caricature outline of themselves. They then recreate the body outline set in front of the elevation of the Pantheon of Rome and the Great pyramid of Giza (Pyramid of Cheops). The goal of this exercise to make the scale of these and other monuments personal to the students.

A different exercise teaches students to build a trabeated arch and a Roman arch from blocks and removable forms. I will need to cut these blocks with one of our department CNC router machines once I return. By physically building these arches the student will get a clearer understanding of how the internal forces work within these systems, and how external forces can affect them. This exercise will work in a conventional or flipped class but is not practical for a fully online version of the course

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⬆ Add/Upload Media ⊞ Create Folder   With Selected -select- ▼ Go   ⚙ Folder Settings   Sort Order

My Media > ARCH250 FALL2019

1 2 3 next › last »

	Title	Date		Status	Options
☐	001 Global mapping and geography as a setting for architecture	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	002 Cartography land masses and the Diamaxion Map.avi	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	003 Key architectural concepts part 1.avi	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	004 Key architectural concepts part2.avi	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	005 Prehistoric architecture part1.avi	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete

☐ 006 Prehistoric architecture part2.avi	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐ 007 Ancient Near East - Mesopotamia part1.avi	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐ 008 Ancient Near East- Mesopotamia part2.avi	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐ 009 Ancient Near East- Mesopotamia part3.avi	07-25-19		Available	Details & Options Add to Playlist View | Edit | Delete
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☐	017 Pre Greek part2.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	018 Pre Greek part3.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
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☐	020 Classical Greece part2.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete

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☐	022 Classical Greece part4.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	023 Classical Greece part5.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	024 Rome part1.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	025 Rome part2.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	026 Rome part3.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	027 Rome part4.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	028 Rome part5.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
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☐	030 Rome part7.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
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☐	032 Rome part9.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	033 Rome part10.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	034 Early Christian and Bizantine architecture part1.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	035 Early Christian and Bizantine architecture part2.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete
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☐	040 Romanesque architecture part4.avi	07-31-19		Available	Details & Options Add to Playlist View | Edit | Delete

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042 Romanesque architecture part6.avi	07-31-19		Available	Details & Options Add to Playlist View	Edit	Delete
043 Romanesque architecture part7.avi	07-31-19		Available	Details & Options Add to Playlist View	Edit	Delete
044 Romanesque architecture part8.avi	07-31-19		Available	Details & Options Add to Playlist View	Edit	Delete
045 Gothic architecture part1.avi	07-31-19		Available	Details & Options Add to Playlist View	Edit	Delete
046 Gothic architecture part2.avi	07-31-19		Available	Details & Options Add to Playlist View	Edit	Delete
047 Gothic architecture part3.avi	07-31-19		Available	Details & Options Add to Playlist View	Edit	Delete
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☐	053 China and east asia part1.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
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☐	056 China and east asia part4.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
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☐	059 Islamic Architecture part3.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	060 Pre Columbian Americas part1.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete
☐	061 Pre Columbian Americas part2.avi	08-03-19		Available	Details & Options Add to Playlist View | Edit | Delete

Courses completed

The following are the courses completed, course descriptions, and the institutions they were completed through.

UCSD extension

Introduction to Online Learning (EDUC-40989). This course offers an overview of distance learning: its history, current status and future progress. Participants will also receive an introduction to learning theories and be introduced to different types of online teaching course design and educational technologies. Using case studies and a historical perspective of the evolution of online teaching, students will understand the challenges and advantages of establishing a distance learning course or program. The course will discuss course design, development, implementation and evaluation and the concept of building community.

UCSD extension

Foundations of Curriculum Design and Evaluation (EDUC-40990). This course presents an overview of curriculum development & an introduction to the Instructional Systems Design Model. Participants will learn to design & evaluate curriculum, develop instructional materials, assess student learning & measure instructional outcomes for use in online classes from K-20 and beyond. Topics include preparation of course outlines & syllabi, development of lessons plans, design of evaluation instruments and an explanation of how learning objectives & evaluation strategies affect the selection of content and materials.

Flipped Learning Global Initiative

Flipped Learning 3.0 Certification Level – I   taught by Jon Bergmann

Course description: The Flipped Classroom movement is sweeping the world. Passionate educators have embraced the model and have been implementing it for over a decade. Flipped Learning has shown great promise and potential, but there have also been several pitfalls. There are a myriad of ways that Flipped Learning can be compromised by bad practice, inappropriate technology, and poor execution. To that end, the Flipped Learning Global Initiative (FLGI), a worldwide coalition of educators, researchers, technologists, professional development providers, and education leaders, has created this Flipped Learning Certification Program. When you complete this course you will be Flipped Learning Certified Level - I.

McNeel Associates Rhinoceros 3d training center

Introduction to generative computational design using Grasshopper 3D

This course is for design professionals who are looking to efficiently learn concepts and features of Grasshopper at an accelerated pace in an instructor-led online environment.

Instructor Andres Gonzalez will get you started with generative modeling in Rhino 5 using the Grasshopper add-on. The advantages of using Grasshopper in preliminary design and concept development come to life in numerous real-life examples.

Grasshopper will be part of Rhino 6. Get a head start on discovering how to use Rhino's computational design feature. The class will be conducted in English using the GoToTraining software. You will need Rhino 5.0 for Windows or the Rhino 5.0 for Windows Eval installed. You will also need the latest build of Grasshopper.

MtSAC (SPOT Certification)

SPOT, or Skills and Pedagogy for Online Teaching is the certification process for Mt. SAC faculty who wish to teach courses online. Faculty members develop a basis in the skills and pedagogy needed for effective online teaching, and demonstrate their knowledge through the completion of tasks in the certification process.

Benefits of this sabbatical

The activities and course work of this sabbatical led to a variety of benefits for the college, our students and myself. These benefits fall into several key areas.

1. Increased knowledge of alternative teaching pedagogies and course design
2. New technical skills in the area of computational and generative design.
3. Increased skills in working with screen casting and video production for educational purposes.
4. A new and deeper understanding of distance learning and flipped learning processes.

Below I have provided brief statements regarding these areas

1.   Increased knowledge of alternative teaching pedagogies and course design

Our department is composed of four distinct programs, Architecture (ARCH), Industrial Design Engineering (IDE), Manufacturing (MFG), and Engineering Construction Technology (ECT). Despite the large number of courses and sections offered, we currently do not utilize alternative teaching in any of our courses. With the knowledge gained during this sabbatical, I believe we can adjust selected courses and potentially move some to a distance learning setting. The techniques and best practices learned will aid in the hopeful creation of successful and engaging online content. The benefit to the college is the potential for greater scheduling capabilities as well as the ability to reach more potential students. The benefit to students will be greater potential to complete required courses due to the greater flexibility of hybrid and distance learning courses.

2.   New technical skills in the area of computational and generative design

The use of design technologies requires one to stay abreast of the high paced development of new programs and applications. Having a substantial amount of time that can be devoted to learning these technologies provided a level of depth and understanding that was unachievable while also teaching. This deeper level of understanding will work its way into new course materials for the program and help move our students to greater levels of success and completion. Additionally I hope to train other faculty in these areas to provide a greater diversity of faculty with the ability to teach this material

3.   Increased skills in working with screen casting and video production for educational purposes

As a result of this sabbatical I learned so much about the current best practices used to create digital video content for my students. Some parts of this knowledge were a direct result of specifically related course work. Other elements came from self-directed study of how to use software platforms to create and edit education digital video and produce live annotation effects that could be implemented during the recording session as well as in post-production. The benefit to students will be better educational materials structured in more cohesive arrangements than I was previously able to achieve. Additionally I will be able to share what I have learned with my full time colleagues as well as the many adjuncts we employ.

4.   A new and deeper understanding of distance learning and flipped learning processes

Before I completed this sabbatical, I had a personal intellectual bias against distance learning and a simplistic and limited understanding of what a flipped classroom was. The time spent learning and reflecting about distance learning and its many facets has

opened my eyes to how valuable it can be to students who would otherwise not be able to achieve an education. In regards to flipped classrooms, prior to this year I agreed with the notion of being present with and able to help my students with critical thinking and application portions of a course rather than lecturing for 3 hours during a class session. I did not however understand how many forms a flipped classroom could embody nor how to implement this type of teaching in an effective way. The benefit to students will be greater flexibility to achieve their educational goals and better use of instructional time leading to better outcomes. I plan to pass on what I have learned to other members of my department and division.

Appendix a

Architectural and environmental computational design, the use of inverted and hybrid teaching pedagogies in design technical education settings and development of materials for a flipped section of ARCH250

Study sabbatical proposal

Ignacio Sardinas
November 21, 2017
Rev. January 4, 2018

Note to the committee

When I initially submitted my sabbatical application, I did so hoping for a 2 semester leave. Shortly after that submission, I was notified that I had been approved for a 1 semester leave. I spoke with Dr. Malgram on December 20th and she mentioned that the travel component as submitted did not seem to warrant a full semester. The committee felt that it seemed to only entail visiting and photographing the sites. My intention to create a book from the field work did not come across clearly in the proposal. Additionally, after speaking with Dr. Malgram, I Also spoke with Jennifer Galbraith. She suggested I propose an alternate project that would produce a tangible set of products for the second semester of leave. The result of that discussion was an adjusted proposal to create a series of screencasts that could be used in a flipped section of one of our architecture courses. I also expanded the first semester work to include the production of video screencasts in addition to what was previously proposed. The adjustments were resubmitted to Dr. Malgram. After her review she said either alternative was acceptable for the second semesters leave. I chose to create the screencasts for one of our courses as I felt that would be more useful to our students. My leave was approved for 2 semesters.

ABSTRACT

The purpose of this sabbatical is to further my subject matter expertise in two technical areas related to architectural education as well as completing a project to produce screencast learning materials for ARCH250.- One of these areas is the study and subsequent application of computational design and generative modeling as they apply to architectural, environmental and sustainable design. A second area is in applying the growing methods of online, hybrid and inverted teaching pedagogies to the field of architecture which inherently requires the students to participate in studio or lab settings that are hard to achieve in those pedagogical learning environments.

Description and nature of activities
Architectural and environmental computational design, the use of inverted and hybrid teaching pedagogies in design technical education settings, and development of materials for a flipped section of ARCH250

Overview of sabbatical proposal: Architectural and environmental computational design, the use of inverted and hybrid teaching pedagogies in design technical education settings, and development of materials for a future flipped section of ARCH250

The purpose of this sabbatical is to further my subject matter expertise in two technical areas related to architectural education as well as completing a project to produce screencast learning materials for ARCH250.- One of these areas is the study and subsequent application of computational design and generative modeling as they apply to architectural, environmental and sustainable design. A second area is in applying the growing methods of online, hybrid and inverted teaching pedagogies to the field of architecture which inherently requires the students to participate in studio or lab settings that are hard to achieve in those pedagogical learning environments.

Computational design and generative modeling are increasingly important modes of investigating and iterating design paradigms and ideas. These methodologies and related application programs are relatively new and are expanding at same fast rate as the rest of the digital world. To improve and expand my expertise in these areas I propose completing a professional level course in this field of study as well as completing a self-study component.

In the subject of online, hybrid and inverted teaching pedagogies, I propose completing two courses from the UCSD Extended University program in education and obtaining a level 1 certification in inverted classroom instruction from FLGI.org. I will also complete the Mount San Antonio College spot certification course as well as complete a series of training tutorials expanding my knowledge and expertise of the canvas learning management system.

The third part will be a project to produce screencast learning media that can be used to flip the architecture program course ARCH250.

Methods of Investigation

Part 1: Architectural and environmental computational design

This portion of the study sabbatical will constitute approximately 35% of the combined project. Methods of investigation will include attending workshops or conferences, a self-directed study and learning of the application programs through online resources, tutorials, and training manuals as well as taking the Intro to Grasshopper course offered by the software company.

Course: Intro to Grasshopper, McNeel Associates

This course is for design professionals who are looking to efficiently learn concepts and features of Grasshopper at an accelerated pace in an instructor-led online environment.

Instructor Andres Gonzalez will get you started with generative modeling in Rhino 5 using the Grasshopper add-on. The advantages of using Grasshopper in preliminary design and concept development come to life in numerous real-life examples.

Grasshopper will be part of Rhino 6. Get a head start on discovering how to use Rhino's computational design feature. The class will be conducted in English using the GoToTraining software. You will need Rhino 5.0 for Windows or the Rhino 5.0 for Windows Eval installed. You will also need the latest build of Grasshopper.

The product of this portion of this directed study will be the creation of a series of 10 video tutorials covering an introduction to computational design methods in architecture utilizing the Rhino/ Grasshopper 3d platform. The topics for the videos are as follows:

1. Grasshopper interface, procedures and processes
2. Introduction to computational components, inputs, outputs & variables
3. Referencing geometry from Rhino3d into the grasshopper interface
4. Utilizing Grasshopper 3d mathematical functions and components
5. ~~Working and manipulating geometric data fields and lists.~~
6. ~~Utilizing data partition sets to divide composite data lists~~
7. Incorporating Numeric variable sliders and randomizers
8. Using the Pipe, Cap, Cover function to solidify vector geometry.
9. Solidifying generative models utilizing the Grasshopper "Bake" Function
10. Utilizing color in generative iteration

Part 2: Inverted and hybrid teaching pedagogies in design technical education settings

This portion of the study sabbatical will constitute approximately 30% of the combined project. Methods of investigation will include taking courses, and self-directed study and learning of the application programs.

The proposed institutions I plan to take courses from include

UCSD extension or Cal State East Bay

Introduction to Online Learning (EDUC-40989). This course offers an overview of distance learning: its history, current status and future

progress. Participants will also receive an introduction to learning theories and be introduced to different types of online teaching course design and educational technologies. Using case studies and a historical perspective of the evolution of online teaching, students will understand the challenges and advantages of establishing a distance learning course or program. The course will discuss course design, development, implementation and evaluation and the concept of building community.

Foundations of Curriculum Design and Evaluation (EDUC-40990). This course presents an overview of curriculum development & an introduction to the Instructional Systems Design Model. Participants will learn to design & evaluate curriculum, develop instructional materials, assess student learning & measure instructional outcomes for use in online classes from K-20 and beyond. Topics include preparation of course outlines & syllabi, development of lessons plans, design of evaluation instruments and an explanation of how learning objectives & evaluation strategies affect the selection of content and materials.

Flipped Learning Global Initiative

Flipped Learning 3.0 Certification Level – I   taught by Jon Bergmann
Course description: The Flipped Classroom movement is sweeping the world. Passionate educators have embraced the model and have been implementing it for over a decade. Flipped Learning has shown great promise and potential, but there have also been several pitfalls. There are a myriad of ways that Flipped Learning can be compromised by bad practice, inappropriate technology, and poor execution. To that end, the Flipped Learning Global Initiative (FLGI), a worldwide coalition of educators, researchers, technologists, professional development providers, and education leaders, has created this Flipped Learning Certification Program. When you complete this course you will be Flipped Learning Certified Level - I.

MtSAC (SPOT Certification)
Skills and Pedagogy for Online Teaching

Part 3: preparing screencast learning materials that can be used in Flipping or Hybridizing ARCH250 World Architecture I

This portion of the study sabbatical will constitute approximately 35% of the combined project. I will apply what I have learned to create a flipped version of the ARCH250 World Architecture 1 course. The content of this course is contextualized for students interested in design and focuses on periods approximately ranging from prehistoric through the beginning of the Italian Renaissance. I will develop and produce a series of video screencasts, and other learning media that can be used in a flipped section of the course. Students would use classroom time to analyze, compare, and contrast the design features and techniques as well as enter into group discussions concerning the meaning and evolution of architecture. The students will also work collaboratively in class on worksheets and projects related to the material and produce group presentations on a wide range of topics.

The proposed screencasts topics include the following;

1) Global Mapping and geography as it relates to the development of architecture
2) Building a Dymaxion Globe
3) Key Architectural Concepts and methods of analysis
4) Prehistoric Markers, Monuments And Ritual Sites
5) Prehistoric Architecture And Early Communities
6) Lines of axis in architectural organization
7) Ancient Near East / Mesopotamia, Babylonian Architecture And Structures
8) Ancient Near East / Mesopotamia, Assyrian Architecture And Structures
9) Ancient Near East / Mesopotamia, Persian Architecture And structures
10) Repetition in architecture
11) Ancient Egypt, Building Typologies
12) Ancient Egypt, early period
13) Ancient Egypt, Middle period
14) Ancient Egypt, late period
15) Hierarchy in architecture
16) Ancient Greece, Building Typologies
17) Ancient Greece, the origins of Greek architecture
18) Ancient Greece, Classical Greek Architecture
19) Ancient Rome, Building typologies
20) Ancient Rome, Construction technology
21) Ancient Rome, the period of the republic
22) Ancient Rome, the period of the empire
23) Formal Geometry in architecture
24) The Middle ages, Christian – Byzantine Architecture
25) The Middle ages, Romanesque Architecture
26) The Middle ages, Gothic Architecture
27) The Middle ages, Islamic Architecture

28) Early Asian and Hindu Architecture
29) Early Chinese Architecture
30) Early Japanese Architecture
31) Inside outside relationship
32) The Pre Columbian Architecture of the Americas

Based on past experience as well as discussion with Phillip Wolf of the MtSAC Physics Department I am estimating that each video will require approximately 20 to 30 hours of time to script, produce graphic materials and produce video screencasts. The total time estimated to produce this product is 16 to 20 weeks.

The benefit to the college: at the conclusion of the sabbatical I will be able to provide my program with the materials I have developed as well as apply what I have learned to other courses within the department. The students will benefit from the ability to learn and digest materials at a rate they are comfortable with rather than the set pace of in class lectures. I can also participate in Train the Trainer scenarios within my department and the college as a whole.

Time line of proposed activities

This timeline is based on institutional or organizational scheduling for the current Academic Year (2017-2018). The specific days and times of classes offered could change during the next academic year. I have contacted the organizations and schools that are offering the courses I intend to take. They have all stated that scheduling for next year would more than likely be based on this year's schedule, but they cannot guarantee that the courses will be offered at the same time. Because of the potential for change I have included more courses than I intend to take to offer flexibility to this project.

Semester 1

September 2018
> Introduction to Online Learning, UCSD (EDUC-40989) or
> Introduction to Online Teaching and Learning, CSEB (OTL 6701)

October 2018
> Foundations of Curriculum Design and Evaluation, UCSD (EDUC-40990)
> Teaching Models for Online Instruction, CSEB (OTL 6702)
> Flipped Learning 3.0 Certification Level – I

November 2018
> Intro to Grasshopper, Mcneel Associates
> Rhino3d/ Grasshopper3d program learning and tutorials
> Ladybug3d and Honeybee3d Program learning and tutorials
> Develop new course materials and tutorials for ARCH222 (Advanced Digital Media, Illustration and Animation)

December 2018
> Continue Developing new course materials and tutorials for ARCH222 (Advanced Digital Media, Illustration and Animation)

Semester 2 (part 3)

March 2019
> Develop scripts, graphics and produce video screencasts 1-10

April 2019
> Develop scripts, graphics and produce video screencasts 11-21

May 2019
> Develop scripts, graphics and produce video screencasts 22-32

June 2019
> Incorporate into a new Canvas Course

Statement of anticipated value

There are many benefits to Mount San Antonio College, my department and to myself from my proposed sabbatical studies. I will highlight benefits from the three areas of study in the following text. One general benefit related to my self-development would be a solid amount of time devoted to reflection concerning the substantial changes that have been implemented in our department over the past few years.

1. Architectural and environmental computational design.

The use of design technologies requires one to stay abreast of the light speed development of new programs and applications. Having a substantial amount of time that can be devoted to learning these technologies will provide a level of depth and understanding that is unachievable while also teaching. This deeper level of understanding will work its way into new course materials for the program and help propel are students to greater levels of success and completion.

Incorporation and expansion of the use of Computational design within the department courses will keep Mt San Antonio College's architecture program in the Forefront of technology which is essential for our students to be competitive in the workforce and in ability to transfer to university level programs.

2. The use of inverted and hybrid teaching pedagogies in design technical education settings

Our department which is composed of four distinct programs (ARCH, IDE, MFG, ECT) currently does not utilize distance learning in any of our courses. Expanding my knowledge of online teaching and distanced learning will benefit our students as well as colleagues within my department by providing us with methodologies and pedagogies helpful to creating quality online and hybrid CTE type courses for our students.

Having an in-depth understanding of the issues related to online teaching and distance learning will help me understand and incorporate successful methods in the design, development, and implementation of hybrid distance learning courses for our students. This pedagogical expertise could also allow me to make a more active role relating to professional development regarding online teaching and distance learning on our campus.

Evidence of discussion with colleagues

I have discussed all or portions of my proposed study sabbatical with several of my colleagues here at MtSAC, including Dean Jemma Blake-Judd, Department Chair Stephen James, Professor Hirohito Kuroki and Professor Mitchell DeJarnett. I am attaching letters of recommendation as evidence of this discussion.

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Appendix b

Flipped Learning 3.0
Level - I Certification

Has been achieved by

IGNACIO SARDINAS

THROUGH SUCCESSFUL COMPLETION OF THE
10 HOUR FLIPPED LEARNING 3.0 LEVEL - I CERTIFICATION PROGRAM
May 23, 2019

Flipped Learning
Global Initiative

Jon Bergmann

Chief Academic Officer
Jon Bergmann
FLGLOBAL.ORG

Flipped Learning Certified
3.0
Level - I
2019

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CERTIFICATE

This certificate is proudly presented to

ignacio sardinas

This learner played a critical role in the success of the class and
demonstrated they have mastered the basics of

Intro to Grasshopper for Rhinoceros 6

22 - 25 Apr 2019

Date of Completion

Rhino Instructor

Trainer

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Grade Report

Final Grade

Introduction to Online Learning EDUC-40989	
Section ID: 132066 Enroll Date: 06/18/2018 Grade Option: Letter Grade Units: 2 Dates: 07/02/2018 - 07/27/2018	A

Printed on 8/04/2019

Grades: A+, A, A- = Excellent 4.0, 4.0, 3.7 | B+, B, B- = Good 3.3, 3.0, 2.7 | C+, C, C- = Fair 2.3, 2.0, 1.7 | D = Poor 1.0 | F = Fail 0.0
P = Passing (C- or better) | NP = Not Passing (below C-) | I = Incomplete | NR = No Record | NFC = Not For Credit

Grade Options: L = Letter Grade | P = Pass/No Pass | NFC = Not For Credit

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Grade Report   Final Grade

Foundations of Curriculum Design and Evaluation EDUC-40980	
Section ID: 136578 Enroll Date: 02/17/2019 Grade Option: Letter Grade Units: 2 Dates: 02/18/2019 - 03/15/2019	A+

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Grades: A+, A, A- = Excellent 4.0, 4.0, 3.7 | B+, B, B- = Good 3.3, 3.0, 2.7 | C+, C, C- = Fair 2.3, 2.0, 1.7 | D = Poor 1.0 | F = Fail 0.0
P = Passing (C- or better) | NP = Not Passing (below C-) | I = Incomplete | NR = No Record | NFC = Not For Credit

Grade Options: L = Letter Grade | P = Pass/No Pass | NFC = Not For Credit

Appendix c

References

Architectural and environmental computational design

Aish, R. (2011). DesignScript: Origins, Explanation, Illustration. Springer Science & Business Media

Gengnagel, C. (2011) Computational Design Modeling: Proceedings of the Design Modeling Symposium.

Hensel, M. (2010) Emergent Technologies and Design: Towards a Biological Paradigm for Architecture

Knippers, J. (2011) Digital Technologies For Evolutonary Constructions. Springer Science & Business Media

Snyder, J. (2001) A computational design analysis and generation of R.M. Schindler houses. DSpace at MIT

Stauffer, N. (2017) Energy-efficient design simuation and modeling. MIT DSpace at MIT