

GSVS 3559 (1-3 credits) MULTIDISCIPLINARY DESIGN THINKING I

Formal description of the course

A collaborative design thinking environment in which students craft solutions to emerging challenges – in areas such as sustainability. The course provides an in-depth design experience reflective of contemporary professional practice. Key attributes include the multidisciplinary composition of design teams, an emphasis on modern practice, problems selected by students, and client-stakeholder engagement. The popular, effective design thinking process is followed. Students select a design space, conceive of a solution, and explore the viability of that solution.

An operational description of the current course sequence

This fall semester course can be part of a two semester program of study. The fall course guides students through the first two stages of the design process as shown in Figure 1. It also sets the stage for stage 3: Explore.

DEFINE the challenge (5 weeks)

Student work begins once they organize into teams and begin to DEFINE a challenge space (i.e., a problem or opportunity) of their own choosing. After students have understood their challenge space through reflective thought, external research, and subject matter expert interviews, they move on to GENERATE & SELECT a set of design requirements and possible solution concepts to their challenge.

GENERATE & SELECT solution requirements and concepts (5-7 weeks)

Requirements and solution concepts are developed via reflective thought, external research, and subject matter expert interviews. Requirements are expected to include numerical specifications related to functional performance. A formal decision-matrix based process is used to justify the selection of a “most promising” solution concept for prototype-based exploration.

EXPLORE the most promising solution (2-4 weeks)

Having selected a “most promising” concept, teams begin to lay out plans for multiple physical and analytical (i.e., simulation-based) prototypes. Planned prototypes and related experiments must assess the ability of the selected concept to achieve some functional requirements specified in the GENERATE & SELECT stage.

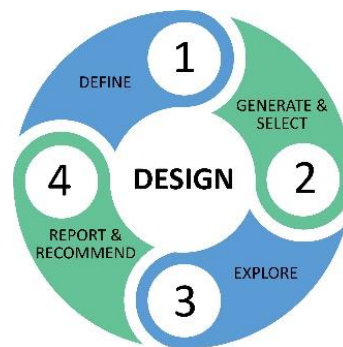


Fig. 1: The design thinking process

Assessment & Measurement

Design Reports (50%)

Oral and Poster Presentations (15%)

Professional communication & class participation (15%)

Design Notebook (10%)

Schedule management (10%)

The grading rubrics used to assess the major design assignments of GSVS 3559 are as follows:

DEFINE the challenge

Define, a challenge that engineering can reasonably be expected to address: The challenge is clearly and objectively identified and defined with considerable depth, and it is well elaborated with specific detail; the justification of the challenge highlights the concerns of many primary stakeholders and is based on comprehensive, timely, and reliably credible sources; it offers consistently objective detail from which it should be possible to determine multiple, measurable design requirements.

GENERATE & SELECT solution requirements and concepts

Generate, requirements: Design requirements are listed and prioritized, and they are consistently clear and detailed; these design requirements are consistently measurable. Designs that fulfill the articulated requirements should lead to a tangible and viable solution to the identified challenge. The requirements embody the needs of many if not all primary stakeholder groups.

Generate, solution concepts: The process for generating and comparing possible solutions was comprehensive, iterative, and consistently defensible; it demonstrated methodical creativity, and it positioned the designers to make a viable and well-justified selection decision. Prior engineered solutions by others have been researched and critiqued in the report. Analysis of the solutions of others, including strengths and weaknesses, is consistently clear, detailed, and supported by relevant data.

Select, key requirements and a most promising solution concept: The design selection process showed close attention to key requirements; the plan of action has considerable merit and would support repetition and testing for effectiveness by others.

Review, the selected solution concept: The proposed design solution does not obviously violate science, technology, engineering, or math (STEM) principles and practices; there is evidence that the application of STEM principles and practices to the proposed solution has been discussed with and reviewed by one or more subject matter experts and that those reviews either confirmed the soundness of the proposed solution or motivated appropriate corrective, iterative review of the design selection decision.

Late policy

All graded assignments in ENGR 1559 / GSVS 2050 will have specific due dates and times listed in the weekly handouts provided by your instructor. Untimed assignments may be turned in up to 72 hours after the assigned due date and time. When such assignments are turned in late (by any amount of time), a 15% grade penalty will be assessed. After a student misses the 72 hour "late submission" window, assignments may be turned in at any time before the official end of the semester, receiving a 50% grade penalty.

Course grade scale

A+	> 97%	B+	87 – 90%	C+	77 – 80%	D+	67 – 70%
A	93 – 97%	B	83 – 87%	C	73 – 77%	D	63 – 67%
A-	90 – 93%	B-	80 – 83%	C-	70 – 73%	D-	60 – 63%
F	<60%						

LEARNING COMMUNITY INTERACTION & ENGAGEMENT

Individual student engagement

Your success in this course will depend on *your* individual efforts and on *our* ability to work together to build a cooperative learning environment. Questions and sharing of beliefs, opinions, and feelings are strongly encouraged. In order to maximize our learning, we will need to create a safe community in which we will feel comfortable sharing thoughts and ideas even when those thoughts and ideas are not in full agreement with the thoughts of others in the course. Achieving a safe learning environment requires practice and effort. It will require each of us to behave professionally and respectfully at all times, and to adhere to our course norms. As you learn in this course and learn about your classmates, you are encouraged to respect and appreciate differences.

Learning community values

Meaningful and courteous dialogue is expected in this course. Healthy dialogue will require a degree of respectful understanding and a willingness to listen to all course participants. You may not agree with another person's point-of-view, or you may already understand a concept and feel frustrated with the pace of class discussion at times. Give others a chance to contribute and learn. Encourage one another politely. Seek to understand and appreciate the ideas of others. Learn from one another. Be patient and encouraging as we *all* seek to advance our knowledge of important sustainable energy system concepts. Since every student is entitled to full participation in this course without interruption, all students are expected to come to class sessions prepared and on time. You are always expected to refrain from undertaking any activities that might be considered disruptive.

Class schedule and time commitment

This course is a 1 - 3 credit hour course at the University of Virginia. Students should understand that the U.S. federal government mandates a certain *minimum* student workload for each credit hour earned while in college. By the federal definition, a credit hour is an amount of work that reasonably approximates *not less than* one hour of classroom or direct faculty instruction and a minimum of two hours of out of class student work each week for approximately fifteen weeks for one semester hour of credit, or the equivalent amount of work over a different amount of time. Students who spend less than the minimum should have no expectation of passing the course.

Use of email

Your instructor will seek to minimize the number of course related messages sent to you by email. Still, email messages to the class and to individual students will be necessary from time-to-time. Your instructor expects that you will check your university email account at least one time each day, Monday – Friday during the semester. If an email includes a specific request for a response, it is your instructor's expectation that you will respond in no more than two business days from the time that the email was *sent* to you (not from the time that you read the email). Failure to read and respond to emails from your instructor in a timely manner (as defined above) will have a negative impact upon your class participation grade.

Respect and safety

Your instructor is committed to supporting and encouraging students, staff, and faculty to take responsibility for safety on our campus. If you or someone you know experience stalking, partner violence, or sexual assault, please remember that you (or he or she) is not alone. If for

any reason you do not feel safe in class, on grounds, or in your personal life, then please do not hesitate to contact your instructor or the Student Health Center. Counseling and Psychological Services (CAPS) is available for all students. Call 434-243-5150 (or 434-972-7004 after hours and weekend) to get started and to schedule an appointment. Call Madison House's HELP Line at 434-295-8255, if you prefer to speak anonymously and confidentially. If you or someone you know is struggling with gender, sexual, or domestic violence, there are many community and University of Virginia resources available to help you. The Office of the Dean of Students, Sexual Assault Resource Agency (SARA), Shelter for Help in Emergency (SHE), and the UVA Women's Center are excellent resources for both men and women. Contact the Director of Sexual and Domestic Violence Services at 434-982-2774.

Special Needs

It is the policy of the University of Virginia to accommodate students with disabilities in accordance with federal and state laws. Any student with a disability who needs accommodation (e.g., in arrangements for seating, extended time for examinations, or note-taking, etc.), should contact the Student Disability Access Center (SDAC) and provide them with appropriate medical or psychological documentation of his/her condition. Once accommodations are approved, it is the student's responsibility to follow up with the instructor about logistics and implementation of accommodations. Accommodations for test taking should be arranged at least 14 business days in advance of the date of the test(s). Students with disabilities are encouraged to contact the SDAC: 434-243-5180/Voice, 434-465-6579/Video Phone, 434-243-5188/Fax. Further policies and statements are available at www.virginia.edu/studenthealth/sdac/sdac.html

Honor code

The University of Virginia relies upon and cherishes its community of trust. Your instructor firmly endorses, upholds, and embraces the University of Virginia's Honor principle that students will not lie, cheat, or steal, and we expect all students to take responsibility for the System and the privileges that it provides. I recognize that even one Honor infraction can destroy an exemplary reputation that has taken years to build. Acting in a manner consistent with the principles of Honor will benefit every member of the community both while enrolled in this course and in the future.

If you have questions about the Honor System or would like to report suspicions of an Honor offense, please contact your instructor. For more information on the UVA Honor System, please visit the following web resource: <http://www.virginia.edu/honor/>