General Studies Gold Request Form

Consult the General Studies Request FAQ for more information and quick answers.

New permanent numbered courses must be submitted to the workflow in Kuali CM before a General Studies request is submitted here. The General Studies Council will not review requests ahead of a new course proposal being sent to the Senate.

Submission Information

College/School	Department/School
Herberger Institute for Design and the Arts (CHI)	The Design School (CARCH)

Submission Type

Mandatory Review

ASU Request

Is this request for a permanent course or a topic?

Permanent Course

Subject Code	Course Number	Units/Credit Hours
DSC	236	3

Course Information

Enter the course catalog information, found in the web course catalog or Kuali CM.

Course Title

Introduction to Computer Modeling

Course Catalog Description

Computers in design, including software concepts, specific packages, and problem solving, illustration, typography, modeling and animation.

Enrollment Requirements (Prerequisites, Corequisites, and/or Antirequisites)

Prerequisite(s): Industrial Design BSD major; DSC 101 with C or better; IND 120 with C or better; IND 121 with C or better; IND 122 with C or better; minimum 3.00 GPA OR Visiting University Student

Is this a crosslisted course?

No

Is this course offered by (shared with) another academic unit?

No

If this course or topic already carries a different General Studies Gold (not Maroon) designation than the one being requested, please check this box.

General Studies Gold Designation Request

Requested Designation

Quantitative Reasoning (QTRS)

Attach a representative syllabus for the course, including course learning outcomes and descriptions of assignments and assessments.

DSC 236 Syllabi.docx

Quantitative Reasoning (QTRS)
Quantitative and computational reasoning is essential for success in 21st-century careers, for critically evaluating information in the age of "big data," for assessing the quality of arguments conveyed through digital media, for informed participation in community and social life, and for contributing to the formulation of effective solutions for achieving a sustainable and just future. Quantitative reasoning enables students to apply relevant mathematical, statistical, computational, and visualization methods in academic, social and personal settings.

In a quantitative reasoning course, students learn about data, data management, data summaries, data visualization, and the use of computational tools with data. Data can take many forms, including numerical data, textual data, images, and others. Students also learn about how quantitative reasoning can be used to make arguments clear, precise and verifiable. Finally, they learn to build quantitative models, make predictions, and communicate their findings based on available data. This may include some combination of mathematical, statistical, computational or network models, or visualizations.

Instructions: In the fields below, state the assignment, project, or assessment that will measure each learning outcome, and provide a description. The description should provide enough detail to show how it measures the learning outcome. If needed, more than one can be identified.

The proposal does not need to include all course assessments that measure a given learning outcome. The provided assessment should include sufficient detail to allow the subcommittee to make their evaluation. When appropriate, the same assessment can be listed for more than one learning outcome (e.g., a culminating project).

You may provide links to a document (Google Drive or Dropbox) that includes the relevant details for the assessment. Do not provide links to Canvas shells.

QTRS Learning Outcome 1: Understand variables, measurement and data, including how they can be used to pose and answer questions about society and nature, and to manipulate, organize, classify and visualize quantitative data.

Assignment: Parametric Product Design

In this assignment, students will be tasked with designing a consumer product using parametric modeling techniques in SolidWorks and visualize the concept image in KeyShot. The project will require students to define and manipulate variables such as dimensions, material properties, and tolerances. Students will collect and analyze data related to the product's performance, such as stress analysis, weight optimization, and material usage, in order to make informed design decisions.

The assignment begins with students identifying a societal or environmental need that the product design addresses, such as reducing material waste or improving ergonomic comfort. Students will use measurement data to explore how different variables affect the performance and sustainability of the product. They will visualize this data through 3D renderings to illustrate how their design evolves in response to their findings.

Learning Outcome Measurement

1. Understanding Variables and Data: Students will define key variables related to their product's design and performance. They will use parametric modeling to adjust these variables and observe the effects on the product, thereby gaining an understanding of how variables influence outcomes.

2. Data Visualization: Students will organize and classify the data they collect during the modeling process, presenting their findings through visualizations in SolidWorks and KeyShot. These visualizations will include technical drawings, orthographic views, exploded views, and photorealistic renderings that communicate the impact of their design choices on the final product.

QTRS Learning Outcome 2: Evaluate arguments from everyday life or academic fields of study that are represented mathematically, statistically, computationally, or in visualizations.

Assignment: Sustainable Product Redesign

In this assignment, students will select an existing consumer product (remote, sunglasses, houseware, etc.) and redesign it with a focus on sustainability and efficiency. The goal is to improve the product’s environmental impact through changes in material selection, manufacturing processes, and overall design.

Learning Outcome Measurement

1. Evaluating Arguments Mathematically and Statistically: Students will assess the sustainability and efficiency of the original product using mathematical tools. They will then compare this with their redesigned product, using the data to evaluate the effectiveness of their design improvements.

2. Computational Analysis: Through the use of SolidWorks simulations and KeyShot animation, students will computationally analyze their design’s structural integrity, material efficiency, and overall performance, ensuring that their redesign is not only sustainable but also functional.

3. Visualization: By using KeyShot to create detailed visualizations, students will translate complex computational and statistical data into clear, visually compelling arguments that support their redesign decisions. This will help them effectively communicate their evaluation of the design improvements.

QTRS Learning Outcome 3: Formulate hypotheses, mathematical models or narratives that are consistent with quantitative data.

Project: Ergonomic Product Design and Analysis (Houseware product)

In this assignment, students will engage in the design and analysis of an ergonomically optimized consumer product, such as houseware products, handheld devices, furniture, or wearable devices. The objective is to create a new product that aligns with specific ergonomic principles, supported by quantitative data on human factors and user interaction.

Learning Outcome Measurement

1. Formulation of Hypotheses: Students will develop a clear hypothesis on how specific design changes will improve ergonomic outcomes, directly informed by quantitative data on human factors.

2. Mathematical Modeling: The assignment requires the creation of mathematical models to predict the impact of design changes on user comfort and ergonomics. These models guide the 3D modeling process in SolidWorks.

3. Visual Narratives: Students will use KeyShot to create visual representations that effectively communicate how the product design addresses the ergonomic issues identified, reinforcing the connection between their initial hypothesis and the quantitative data.

QTRS Learning Outcome 4: Communicate how quantitative data, interpretations, or models are connected to outcomes, predictions, decisions, explanations, or future states.

Project: Consumer Product Design Presentation

In this assignment, students will undertake a comprehensive design project that involves creating a consumer product from concept to a fully developed 3D model. The project focuses on integrating quantitative data throughout the design process, from initial concept development to final product presentation, to clearly communicate how data-driven decisions impact the design outcome, predictions about the product's performance, and its potential future states.

Learning Outcome Measurement

1. Connecting Quantitative Data to Outcomes: The assignment ensures that students demonstrate how the quantitative data they gather directly influences their design decisions, resulting in specific, measurable outcomes in the product's performance.

2. Interpretation and Communication: By interpreting simulation results and using them to refine their design, students show their ability to connect models to outcomes and predictions. This is further communicated through detailed presentations and visualizations.

3. Predicting Future States: Students are required to predict the future performance of their product and discuss how future data might impact subsequent designs, demonstrating their understanding of the ongoing relationship between quantitative data and design evolution.

4. Comprehensive Documentation: The final presentation provides a clear narrative that links every stage of the design process—from data collection to model creation, interpretation, and visualization—to the final product outcome and future predictions.

QTRS Learning Outcome 5: Effectively employ one or more digital tools to demonstrate quantitative reasoning, interpretations of calculations, or the creation and evaluation of visualizations.

Project: A New Product Development and Presentation

This capstone assignment requires students to employ SolidWorks and KeyShot as digital tools to effectively design, model, and present a consumer product. The goal of the project is to integrate these digital tools to accomplish the complete cycle of product development, from initial conceptualization to the final presentation with high-quality renderings.

Learning Outcome Measurement

1. Effective Use of SolidWorks: The assignment assesses the student's ability to employ SolidWorks as a digital tool for 3D modeling, simulation, and iterative design refinement. Their proficiency in using the software to create functional and aesthetically pleasing models directly measures this aspect of the learning outcome.

2. Effective Use of KeyShot: The project also evaluates how students utilize KeyShot to create compelling visual representations of their designs. Their ability to produce high-quality, photorealistic renderings that accurately reflect their design intentions demonstrates effective use of this digital tool.

3. Integration of Digital Tools: The assignment measures how well students integrate SolidWorks and KeyShot to accomplish the overall design and presentation goals. Their ability to move seamlessly between modeling and rendering, using each tool to its fullest potential, is a key indicator of meeting this learning outcome.

4. Outcome Achievement: The final presentation and submission provide concrete evidence of how effectively students used these digital tools to achieve the desired design outcomes, such as a functional 3D model with simulations and visually impactful renderings.

List all course-specific learning outcomes. Where appropriate, identify the associated QTRS learning outcome(s) in brackets (see below for example). Note: It is expected that a majority of course-specific learning outcomes will be associated with a QTRS learning outcome.

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1. Gain an awareness of how CAD software is used in various design disciplines. [QTRS LO5]

2. Learn how CAD can be used as a tool to support your own design interests. [QTRS LO5]

3. Become familiar with terminology related to CAD and rendering and software. [QTRS LO4]

4. Gain competence in using the design software. [QTRS LO5]

5. Understand the differences and similarities among the various types of software. [QTRS LO3, LO4]

6. Become prepared to pursue further study or career in the field of 3D visual design. [QTRS LO1, LO2, LO4, LO5]

7. Learn how to visualize design concepts through digital media. [QTRS LO1, LO5]

Provost Use Only

Backmapped Maroon Approval

No Response

Form Submission - Proposer

Submitted for Approval | Proposer

Keith Smith - August 29, 2024 at 9:40 AM (America/Phoenix)

Department Approval

Approved

Al Sanft

John Takamura

Samantha Perkins

Keith Smith - August 29, 2024 at 9:41 AM (America/Phoenix)

GSC Coordinator Review

Sent Back

Alicia Alfonso - August 30, 2024 at 6:42 PM (America/Phoenix)

The syllabus is missing the course catalog description.
GS syllabus statements must be presented exactly as on
the syllabus statement document: https://docs.google.com/document/d/
1JrFD2qKryUpvc0wvj4C2N8i0lqoQKY4XRmFOgkNnyF0/edit?usp=sharing. Please correct GS
statement 5 on the syllabus.

April Randall

Form Submission - Proposer

Submitted for Approval | Proposer

Keith Smith - September 3, 2024 at 12:30 PM (America/Phoenix)

Department Approval

Approved

Al Sanft

John Takamura

Keith Smith - September 3, 2024 at 12:31 PM (America/Phoenix)

Updates made to the syllabus.

GSC Coordinator Review

Approved

Alicia Alfonso - September 4, 2024 at 3:41 PM (America/Phoenix)

April Randall

Assistant Vice Provost Review

Approved

Tamiko Azuma - September 4, 2024 at 4:30 PM (America/Phoenix)

All required components confirmed

Pre-GSC Meeting

Approved

Alicia Alfonso

April Randall - September 9, 2024 at 3:50 PM (America/Phoenix)

Quantitative Reasoning (QTRS) Subcommittee

Acknowledgement Requested

Abhishek Singharoy - September 19, 2024 at 10:43 AM (America/Phoenix)

Jason Nichols

Terri Kurz - September 27, 2024 at 4:58 PM (America/Phoenix)

Revise and Resubmit: The course objectives and course student learning outcomes listed on the syllabus do not align with the QTRS paperwork. The course content (description, objectives and so on) need to align throughout, not just on the QTRS paperwork. The actual assignments need to be turned in with the QTRS paperwork, not just descriptions of assignments. For example, this is an assignment description: “In this assignment, students will select an existing consumer product (remote, sunglasses, houseware, etc.) and redesign it with a focus on sustainability and efficiency. The goal is to improve the product’s environmental impact through changes in material selection, manufacturing processes, and overall design.” Learning outcomes follow. As a student, I would not know what you expected from this assignment. The learning outcomes should not be listed, but content provided to students to describe the assignment should be included. The quoted assignment, above, also has nothing to do with QTRS objectives. The assignments are really hard to follow and do not make sense. Their alignment with QTRS learning outcomes are listed but not contextualized through meaningful curriculum descriptions. Soldworks is spelled incorrectly.

Michelle Mancenido

Elizabeth Kizer

General Studies Council Meeting

Waiting for Approval

Alicia Alfonso

April Randall

Proposer Notification

Notification

Keith Smith

College Notification

Notification

Stephani Etheridge Woodson