

Examples of Honors Options

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Read Me

This document includes examples that are meant to guide you when writing your honors option. As seen in these examples, an application includes (1) a description of the course, (2) an explanation of how the option extends the content of the course, and (3) a statement of deliverables including (at least) an in-person presentation of your work in a public setting.

College of Art and Design

IDDE-302 Junior ID Studio II

Project Title

Concept Furniture Studio Honors Option

Course Description

This course will highlight the application of design methods and processes through projects that focus on deepening the students' problem-solving skills, studio skills (two- and three-dimensional sketching, drawing, CAD), shop skills (model making) and presentation skills. Emphasis will be placed on collaborating with multidisciplinary partners outside the industrial design program, and/or, when circumstances allow, with external resources such as clients or project sponsors.

Overview

In this option I will progress from the research and development phase of furniture design through the prototyping phase, creating a polished, professional-grade wooden stack laminated lounge chair. Stack lamination is a slow and thoughtful process of assembling layers of material and binding each layer at a time. It is an advanced technique (not covered in the class) that was popularized in the 1960s by Wendell Castle, who is known as the Father of the American Art Furniture Movement, is RIT-affiliated, and was the first class to enter the Innovation Hall of Fame. Castle's work bends the line between art, craft, and function.

In the first leg of this project, I will make an eight-inch laser-cut stack laminated model; a full-scale wooden model will be created in the second stage. To get each full-scale stackable layer I will model the chair in Autodesk Fusion 360 and export the file as an STL file. An application called Sli3er will convert the STL into a type that can be read by VCarve Pro, which is compatible with the RIT Construct's CNC Saber Router. Once the CNC router processes my files, I will be left with precisely cut stackable layers. An angle grinder will be used to smooth the assembled layers. These high-tech solutions ensure that there is minimal waste of material and time. This option will help me learn the programs mentioned above, will provide advanced experience with cutters, routers, and grinders (valuable skills in industry), and will augment my Industrial Design portfolio with an impressive full-scale model.

Deliverables

Under the guidance of the course instructor, I will put together my sketches, 2D and 3D prototyping progress, FDM 3D prints, stack laminated laser cut scale model, and final full-scale prototype into a presentation that I will present to the class. The course instructor will determine whether I have met the requirements for this Honors option in a satisfactory display of design research and presentation.

IDEA-251 Visual Storytelling

Project Title

Graphic Novels as an Accessible Medium for Scientific Communication of Endocrinology

Course Description

This course is an intensive investigation into the graphic novel as a medium for artistic practice. Designed for students interested in the art of storytelling through graphic novels. Students will explore composing a story, developing a pace through layout and composition, learning the fundamental tools of sequential illustration and then unifying the entire structure with the intent of creating a graphic novel.

Overview

Graphic narratives used for scientific communication have become increasingly popular over the past decade, with the popularity of published works such as Neurocomics (by neuroscientists Dr. Matteo Farinella and Dr. Hana Ros) and Human Body Theater by Maris Wicks. Graphic novels are a powerful tool for scientific communication, as use of character driven narrative, digestible metaphor, and striking visualization all aid in memorability and accessibility of a presented medium. This is crucial in an era where scientific literacy, while around 10 percent higher than the late 1980s and early 1990s, remains 28 percent amongst American adults according to Michigan State University researcher Jon Miller. This is concerning, especially in a democratic society, as scientific knowledge is crucial for individuals to make informed decisions, address societal problems, and partake in evidence-based practices. In this Honors option, I will create an introductory graphic novel on endocrinology for a nonexpert general audience. Here, I will implement visual storytelling techniques, formal features and devices to tell a compelling, coherent story about the endocrine system. This short graphic novel will cover major endocrine organs, glands, and hormones (alongside their physiological processes) in a creative manner. The initial script, extensive background scientific research, idea, story structure, layouts/thumbnails and the finished work will all be documented and presented to the instructor for critique a teach stage. The final work will be physically printed with citations of peer-reviewed academic papers information was gathered from. Procreate and Adobe Illustrator will be used in tandem for the creation of this graphic novel. Creation of a graphic novel breaking down introductory concepts of endocrinology into an accessible and engaging story will allow me to build skills of scientific communication and visual storytelling.

Deliverables

Under the guidance of the course instructor, I will put together my script, thumbnails, research, and final graphic novel (physically printed) into a presentation for the class and the RIT Scientific Visualization Club. In this presentation, I will also provide commentary on the value and effects of visual narratives in science communication and education. Peer-reviewed studies on how comics as a medium aid in knowledge acquisition, attitude and engagement with science will be explored as well. The course instructor will determine whether I have met the requirements for this Honors option in a satisfactory display of research, creation, and presentation.

PAIT-201 Introduction to Painting

Project Title

Master Inspired Painting and Narrative

Course Description

This course will explore techniques in painting to advance students' understanding of subjects such as color theory, building compositions and the effective use of painting materials. Individual approaches to

content range from abstraction through representational art, as students address contemporary visual arts issues.

Overview

Oil painting has a long and rich history of techniques, styles, and eras. As a painter, one of the best ways to expand one's own understanding is to study the techniques and styles of master artists. One such unique artist is Alice Herbst, who infuses traditional painting with drawing, photography, technological manipulation, and storytelling with deep personal narratives. In this Honors option, I will research Herbst's unique image-making styles and place myself in her shoes, experiencing the whole journey of her painting style to learn more about oil painting. Part of the process will include creating supplemental drawings, physical items, and digital references, as well as ultimately my own reference of my compiled reference images. Additionally, I will study her own narratives and symbolism to develop a deeply thematic and personal piece and visually depict it in a Herbst-inspired painting. Over the course of the project, I will document the image-creation, narrative, and painting process to present at the end of the semester. Studying and replicating Herbst's style will be a challenge of size, detail, realism vs. abstraction, experimentation with diverse mediums that go beyond the course curriculum and will enrich both my knowledge and skills when it comes to painting technique, style, and narrative creation.

Deliverables

The course instructor will provide guidance of creating master copies and master inspired works, as well as guidance on the various ways to create reference material. I will create a Herbst-inspired painting, and in the process, I will create my own personal narrative to tell through my painting, sketches and narrative ideation, documentation of the image-creation, painting, and research process, and a reflection of the experience of "stepping into Alice Herbst's shoes." Finally, I will compile all this information into a presentation in the painting studio.

College of Engineering Technology

CVET-332 Structural Analysis and Modeling

Project Title

Optimizing Steel Pile Design on Integral Abutment Bridges

Course Description

Introduction of classical and modern computational techniques to analyze statically determinate and indeterminate structures. Topics include beams, 2D trusses, 2D frames, cables and arches, moving loads and influence lines, approximate methods and moment distribution. Computer aided structural analysis using commercial structural analysis software STAAD is involved.

Overview

Integral abutment bridges are an excellent alternative to conventional bridges by eliminating the joints between the girder ends and the abutment walls to reduce drainage issues. Integral abutment design can simplify construction process, lower maintenance cost and increase a bridge's service life. Due to the benefits, applications of integral abutment bridges are being further applied to bridge practices. The most popular foundation style for this type of bridge design is the HP pile; however, HP piles are oriented differently throughout the United States, and limited studies have been done to investigate the soil-pile-structure interaction and the behavior of steel HP piles to verify the pile orientation for optimized design. In this Honors Option, I will compare state-of-the-art design practices and pile design in integral abutment bridges and their effects on bridge performance. Using the advanced modeling software, STAAD. Pro, I will compare the performance of different foundation orientations in relation to different geographic locations, bridge geometry, bridge superstructure type, backfill soil condition/type, subsoil condition/type, and different loading conditions. During my analysis, there will be specific attention to the bridge performance due to seismic loading. Additionally, I will conduct literature reviews of various reports on different pile designs and their effects. Afterwards, I will create my own summary of the literature review and my findings from structural analysis. A presentation will also be delivered during standard class time.

Deliverables

I will complete literature reviews and the analysis of various structural models. A summary report of reviewed literature and the results of structural analysis will be created under the supervision of the instructor. I will create and deliver a presentation to the class during scheduled class time on <date redacted> and write a report for the Geo-Structures 2024 Conference.

ESHS-360 World Water Supply

Project Title

Water Scarcity in Kenya

Course Description

The World Health Organization estimates that one in eight people do not have access to a safe drinking water supply. The U.S. State Department has stated that armed conflict over water rights is possible on many of the world's river systems including the Nile, Tigris/Euphrates, Brahmaputra-Jamuna, and

Mekong. What is the cause of these problems and how will changes to the hydrologic cycle and world water supply brought about by climate change affect them? Students will learn about the hydrologic cycle, the general characteristics of surface water and groundwater, and global patterns of water use. Students will learn about the health, economic, and social consequences of drought and flooding, and the effect climate change is having on water supply in arid countries. Laws and government regulation of water withdrawal and use will be covered, as will techniques to extend the available water supply. Students will consider the positive and negative consequences of increasing the sustainability of the water supply through efficiency, conservation, inter-basin transfer, water use export, grey and black water reuse, urban runoff capture, and the creation of fresh water through desalination.

Overview

Water sustainability is a very important aspect of sustainability, and crucial to the survival of populations all over the world. Unfortunately, fresh water isn't often even distributed. Many parts of the world experience water scarcity or poor water quality. Not having sufficient water resources can lead to negative impacts on agriculture, health, and the overall well-being of the population. Even if a population has enough water if that water isn't clean, it can have many negative impacts on human health. In many cases, people don't have the resources to move toward better water sources, so the government or other organizations must act. In this honors option, I will research the water problems the people of Kenya face. With a focus on the current water sustainability issues, it impacts on the people of Kenya, events that preceded the issues, and current practices that are being used to try and improve the situation. I'll also be highlighting climate change and how it will impact the issue and how the country will have to change its strategies to fix the problem. Also, I'll be using what I've learned in class to suggest other solutions, and what can be done to prevent similar issues from appearing again in the future. This honors option will add to my understanding of water sustainability by helping me to better understand the causes of water scarcity and get a full picture of the issue itself by looking at all the aspects involved. Also, I'll be using what I learned to try and solve real-world problems by coming up with my own solutions to the Kenya water crisis and suggesting preventative measures that can be taken to prevent similar issues from occurring in the future.

Deliverables

Under the guidance of my course instructor, I will write a research paper about Kenya and its past, current, and future water sustainability. Then I will present my findings to RIT students and faculty when the capstone students from my major present their projects. The course instructor will determine whether I have met the requirements for this Honors option in a satisfactory display of high-quality research and analysis.

PACK-241 Packaging for Distribution

Project Title

Examining Packaging Efficiency through Optimization and Distribution Testing

Course Description

An exploration of different shipping, storage, and use environments common to various products and packages. The structural design of shipping containers for product physical protection and methods for testing and predicting package performance are studied. Package converting processes will be studied to reinforce the economics of efficient and sustainable package design.

Overview

In this honors option, I will expand upon the topics taught throughout the course by developing, testing, and evaluating my own packaging design. First, I will choose a product and optimize the packaging components for the chosen item. Next, I will create an efficient shipper and pallet pattern utilizing Artios CAD and CAPE Pack Palletizing Software respectively. To ensure the packaging design properly protects the product, I will develop a test procedure following ISTA 3E test protocol. With the help of the course instructor, I will carry out the testing and evaluate the performance of my design. The completion of this project will improve my ability to develop, optimize, and evaluate packaging which will be imperative in my future career as a packaging engineer.

Deliverables

I will produce a prototype of the case design, as well as the corresponding CAD spec sheets and pallet patterns. I will also create a written report on the optimization process and the evaluation of the dynamic testing completed. Near the end of the semester, I will put together a presentation and share my findings with class.

College of Health Science and Technology

EXSC-280 Sports Psychology

Project Title

Sport Psychology Honors Option

Course Description

“Keeping your head in the game” is one of the hallmarks of success for high performance athletes and this course explores the psychological aspects of achieving that capability. Through examining research-based evidence of successful practices and techniques to produce, that winning edge, students will become versed in the process of coaching athletes to possess and function with athletic “mental toughness.”

Overview

The role of the coxswain on a rowing team is to provide self-talk for the rowers, but there is little emphasis placed on the mental burden of delivering that encouragement. In this honors option I will collaborate with my professor and other sport psychology professionals to create a literature review on the effects of self-talk by the coxswain of a rowing team, both on the rowers and on the coxswain. This literature review will group what knowledge there is on self-talk in rowing, the nature of the coxswain position, and inform research directions in mental strength for that position.

Deliverables

The course instructor will advise my literature review, and I will compile the information I find into a written report. In addition, an oral presentation will be delivered to at the Honors Research and Creativity Symposium. The course instructor will guide my literature review and will assess the substance and quality of my research summaries.

MEDS-250 Human Anatomy and Physiology I

Project Title

Effects of Race-Based Pseudoscience on Modern Healthcare Delivery

Course Description

Anatomy and Physiology I is a lecture and laboratory course focusing on the structure and function of body systems, including the nervous, endocrine, integumentary, muscular and skeletal systems. It is a requirement for the pre-professional phase of RIT’s Physician Assistant program. Laboratory experiences include anatomical dissections, histological study and examination, and physiological experiments. The course description on SIS reads as follows:

This course is an integrated approach to the structure and function of the nervous, endocrine, integumentary, muscular and skeletal systems. Laboratory exercises include histological examination, actual and simulated anatomical dissections, and physiology experiments with human subjects.

Overview

The consequences of systemic racism in the United States are ubiquitous, seen particularly in the quality of healthcare available to people of color and the treatment of minorities in medical research. Historically, medical bias has been a source of discrimination and injustice, supported through questionable anatomical evidence. From pain tolerance to kidney function, racially disparate perceptions of anatomy lead to inequitable treatment offerings in modern healthcare, causing disproportionate loss of life in minority groups to this day.

In this Honors option, I plan to use the basic anatomical understandings learned in this course as a foundation for further literary review of research into racial bias in healthcare. With the help of the course instructor, I will critically examine and evaluate the past anatomical research that permits misunderstandings of anatomy based on race to persist and affect the healthcare offered to persons of color. Investigation into the ways in which minority trust of the healthcare system, healthcare professionals, and medical research is affected by their mistreatment in the system will also be relevant to include. This task will involve extensive reading of published research and journal articles on the topics of race inclusion in medical research, as well as potential interviewing health professionals or students in health professions who are involved in activism towards eliminating racial bias in research and healthcare. The development of such a research project will extend my understanding of anatomy beyond the purely scientific or biological domain. This complex study of anatomy is enriched by a historical and cultural context that will enhance critical awareness of my own biases, helping me to recognize and address prejudice to serve all communities equitably as a better educated and socially aware physician assistant.

Deliverables

The course instructor will advise my literature review, and I will compile the information I find into a report on racial bias in research and medicine that will be made available to interested readers in the College of Health Sciences and Technology to raise awareness on the topic. In addition to a written report, an oral presentation will be delivered to laboratory classmates and other interested parties.

The course instructor will determine whether I have met the requirements for this Honors option in a satisfactory display of high-quality research and analysis.

PHYA-419 Advanced Gross Anatomy

Project Title

The History and Evolution of Ethics and Implications of Cadaver Acquisition for Medical Education

Course Description

Advanced Gross Anatomy is a lab-focused course with the objective of examining cadavers to better understand the anatomy of humans. The course is designed for pre-Physician Assistant students to gain a more comprehensive understanding of the structures and functions of the human body, to apply medical knowledge. The course description on SIS reads as follows: This is a course designed as a laboratory-intensive overview of normal structure in prosected (dissections performed ahead of time by staff) examples of cadaver anatomy. Special emphases will be placed on the anatomical correlates associated with upper/lower extremity, neck, and back muscle groups/joints/bones, peripheral nerve plexuses (including spinal and cranial nerves), major arterial/venous pathways, and body viscera in areas

of the head/neck, thorax, abdomen, and pelvis. Where appropriate, evidence of pathologies will be discussed at the cadaver side. Additionally, students will participate in clinical case presentations that correspond to the dissection subject at-hand throughout the term.

Overview

In this Honors Option, I plan to collect a plethora of data and research from various present and past scientific journals to create a comprehensive review of the evolution of cadaver acquisition and the public discourse surrounding the process. There will be three parts to my research: I will focus heavily on creating a timeline of major events in the history of practices, policies, and the cultural mood throughout the lifespan of bodily donation. I will pay special attention to the transition from unclaimed bodies to voluntary donation types. I also aim to discuss the current practices of RIT's cadaver lab: where, how, and how often they are receiving donations. The supply/demand of cadavers will also be discussed in this section. Finally, I will discuss the ethical practices of faculty and students when using cadavers in an educational setting. I want to include my own perspective as well as collect/conduct short interviews of students in the PA class to create a conclusion about the mood of the medical/PA students who benefit from the use of cadavers in their education. With these three facets together, I should be able to effectively demonstrate the current ethical implications of cadaver acquisition in medical education, and how it has evolved over time.

Deliverables

The course instructor will advise my literature review, and I will compile the information I find into a report on the ethical and moral implications of cadaver use in education that will be made available to interested readers in the College of Health Sciences and Technology to encourage discussion and thoughts on the topic. In addition to a written report, an oral presentation will be given to the class to spark conversation about the history of policies and procedures of cadaver acquisition, a concept we are all benefitting from.

College of Liberal Arts

COMM-357 Communication, Gender, and Media

Project Title

Analysis of Gender Representation in Video Games

Course Description (from SIS)

This course examines the relationship between gender and media communication with specific attention to how gender affects choices in mass media and social media practices. Students explore how gender, sexual orientation, sexuality and social roles, affect media coverage, portrayals, production and reception. They consider issues of authorship, spectatorship (audience), and the ways in which various media content (film, television, print journalism, advertising, social media) enables, facilitates, and challenges these social constructions in society. The course covers communication theories and scholarship as it applies to gender and media, methods of media analysis, and topics of current interest.

Overview

Video games play an important role in gender socialization, especially for youth and young adults, who spent a significant amount of their free time playing and interacting with other like-minded individuals in digital spaces. Gaming norms are founded on masculine behavior and gaming discourse that often emphasizes heterosexist norms and male traits such as blowing things up, killing and domination. Visual representations of characters and avatars often present males as hyper-masculine while females are highly sexualized, normalizing male aggression and reinforcing stereotypes about females being valued for their physical appearance and submissiveness.

In this Honors option, I will apply the theoretical concepts related to gender studies and media studies to analyze video games developed at RIT. Working with the course instructor, I will first conduct a thorough review of the existing research on gender representations on video games, then develop a codebook to analyze video games developed by students, alumni, and faculty at RIT. The goal of the project is to understand how these games represent gender visually and in the game storylines. As a new media and design major, the research findings will help me identify how academic video games address gender-based stereotypes.

Deliverables

The course instructor will supervise my study design, literature review, and analysis of the video games. The completed research paper will be converted into a short presentation that I will share with the New Media Design (NMD) community at a meeting of the undergraduate NMD club.

ENGL-450 Free and Open-Source Culture

Project Title

Malware in the Open-Source Setting

Course Description

This course charts the development of the free culture movement by examining the changing relationship between authorship and cultural production based on a variety of factors: law, culture,

commerce and technology. In particular, the course examines the rise of the concept of the individual author during the last three centuries. Using a variety of historical and theoretical readings, students will learn how law and commerce have come to shape the prevailing cultural norms surrounding authorship and will also examine lesser-known models of collaborative and distributed authoring practices. This background will inform a study of the rapid social transformations wrought by media technologies in the last two centuries, culminating with the challenges and opportunities brought forth by digital media, mobile communications and networked computing. Students will learn about the role of software in highlighting changing authorship practices, facilitating new business and economic models and providing a foundation for conceiving of open source, open access, participatory, peer-to-peer and Free (as in speech, not beer) cultures.

Overview

Free and Open-Source Software (FOSS) is software that allows the user to use, read, edit, and redistribute the software's source code. The concept of FOSS was popularized in the 1980s by Richard M. Stallman, a professor at Massachusetts Institute of Technology. Many organizations and projects use different definitions of Free Software, or use the ambiguous term, "Open Source," which creates inconsistency and interferes with the productivity in FOSS and Open-Source communities. Additionally, FOSS is shrouded in controversy because of infighting and politically motivated licensing practices. Despite these obstacles, many FOSS communities are vibrant and thriving. Notable FOSS projects include the Linux kernel, many BSD and Linux operating systems, the MySQL database and the Apache web server. The FOSS community is relevant today because of libre and privacy activists, passionate software developers, and a growing need for information transparency.

In this Honors option, I will use the course readings to inform and enrich my understanding of FOSS malware tactics, development, communities, and implementation. The articles will highlight the importance of FOSS in malware and cybersecurity, including things like documentation and collaboration. In addition, some articles will examine the social workings and economic development behind successful FOSS malware projects and communities.

My goal is to provide future students, faculty, and other interested parties with quality FOSS malware analysis, which will be used to improve the development and understanding of FOSS at Rochester Institute of Technology. The development of this project will enhance my understanding of malware, FOSS, and the social and economic traits of FOSS malware projects. I will learn about the historical and social context of FOSS issues and highlight their relevance in my research. This independent research project will help me become a better software developer, help future students interested in FOSS malware, and assist the faculty interested in studying FOSS malware.

Deliverables

I will write articles focused on open-source malware and open-source cybersecurity, based on the course readings. The finished articles will be submitted to Wired Magazine, Cyber Defense Magazine, The Linux Journal, The Hacker News, and opensource.com. Near the end of the semester, I will create a presentation on the trends in open-source malware that I will present it to the class and to RITSEC.

PSYC-222 Biopsychology

Project Title

Biological Risk Factors for a Predisposition to Zoom Dysmorphia

Course Description

This course provides an introduction to the field of behavioral neuroscience (the study of neurobiological basis of cognition and behavior). Topics include neuroanatomy and physiology, localization of function, brain injury, research methods in behavioral neuroscience, and biological basis of language, memory, emotion, conscious states, and sexual behavior, with an evolutionary perspective.

Overview

Given the recent switch to online learning, many students are now using Zoom and other face-to-face platforms as a substitute to classroom education. Psychologists have noticed an increase in self-esteem issues, body dysmorphia, and reports of an uptick in people seeking plastic surgery. This phenomenon has been tentatively termed “Zoom Dysmorphia,” and there is a conjecture that this emerging condition has to do with the increase in frequency of seeing oneself on a computer screen.

In this Honors option, I will seek to answer the question of whether there is a biological basis, through family history of mental illness, that increases the likelihood of people being affected by Zoom Dysmorphia. I will begin by researching the literature on this topic and related disorders in which social media is linked to body dysmorphia. I will then complete required online training, which will further my understanding of human research ethics. Next, I will create a survey for students to take. Once data has been collected, I will then analyze it and write a report of my findings. This project will enrich my understanding of biopsychology because it will give me hands-on experience in psychological research as well as expand my knowledge on biological bases for mental illnesses, which will be crucial in my career path in mental healthcare.

Deliverables

The course instructor will advise my literature review prior to the beginning of my project and assist in setting up a quality survey that I will be able to use to answer my research question. Once the data-gathering is complete, I will write a paper describing the methods, data, and results. Finally, I will present the information to the instructor’s research lab group.

College of Science

ENVS-250 Applications of Geographic Information Systems

Project Title

Examining the Aflaj System through GIS

Course Description

Applications of GIS is a general education elective that counts towards the science elective requirement for my major. I chose this course because I hold a strong interest in environmental science and mapping which is not directly related to my major, computer science. This class enables students to use digital maps to present multiple layers of information simultaneously in an effective and easy to understand manner. Additionally, it introduces various applications of spatial analysis across different disciplines through geographic information systems.

Overview

Water is an indispensable natural resource that sustains life on Earth; yet it is not always readily available in all parts of the world, especially deserts. Moreover, as global warming has become more prominent in recent years, and continues to affect Earth's natural water cycle, water availability is an issue that requires serious attention.

In this Honors option, I will explore Aflaj, the traditional irrigation system of Oman. It is a world heritage site that has survived several centuries and is still in active use. I plan to examine its management, and the water resources it utilizes. I will also address possible environmental concerns it faces, including growing population, decreasing rainfall, and depletion of the water table. With the help of the professor, I will learn to use GIS software including ArcGIS Pro/Online to develop a geodatabase, digitize 2-D maps and carry out analyses to achieve the goals.

Deliverables

Under the guidance of the course instructor, I will put together my research in the form of an interactive digital map using Esri's StoryMaps, and I will present it to the class.

MATH-241 Linear Algebra

Project Title

Introduction to Electrical Impedance Tomography

Course Description (from SIS)

This course is an introduction to the basic concepts of linear algebra, and techniques of matrix manipulation. Topics include linear transformations, Gaussian elimination, matrix arithmetic, determinants, vector spaces, linear independence, basis, null space, row space, and column space of a matrix, eigenvalues, eigenvectors, change of basis, similarity and diagonalization. Various applications are studied throughout the course.

Overview

Cancer researchers have found that tumors tend to conduct electricity much better than healthy tissue, and it is hoped that this fact can be exploited to devise a new means of detection: locate tumors by

locating regions of high conductivity (low resistivity). As a practical matter, since our intention is to avoid dissecting the patient, this requires us to reconstruct the conductivity of a body's interior based solely upon knowledge at its boundary, and that is the goal of electrical impedance tomography (EIT).

In this honors option, I will extend the standard course in linear algebra by investigating its application to electrical impedance tomography. Under the direction of the course instructor, I will familiarize myself with the physical laws that govern voltage and current in biological tissue, and the systems of linear equations that result from them in inhomogeneous (location-dependent), anisotropic (direction-dependent) situations. This will involve directed reading, and the completion of exercises in which I see how the ideas and techniques of linear algebra help us to accomplish the goal of EIT. In the end, I hope to have a thorough understanding of the problem and the associated linear algebra.

Deliverables

The course instructor will help me learn the basics of LaTeX (a mark-up language used for mathematical writing), and I will use what I learn to write a report that summarizes the application of linear algebraic ideas to the problem of EIT. I will also deliver an oral presentation of my findings at the Honors Creativity and Research Symposium. The instructor will coach me toward a high-quality outcome and will assess whether my work demonstrates the substance and quality expected of honors students.

PHYS-283 Vibrations and Waves

Project Title

Harmonics Analysis of a Cello Utilizing Discrete Fourier Transformations Under Various Conditions

Course Description (from SIS)

This course is an introduction to the physics of vibrations and waves, beginning with the simple harmonic oscillator, the foundation to understanding oscillatory and vibratory systems. The course will include driven and damped single oscillators, coupled discrete oscillators, and continuous vibrating systems. Connections will be made with many areas of physics that involve oscillation, including mechanics, electromagnetism, and quantum mechanics

Overview

Instruments work by projecting sound using a vibrating medium. Almost every instrument has some sort of vibrating film and or string to play the note that is desired by the player. For the cello, the main way sound is created through a combination of a chordophone and membranophone. The string is the main “membrane” of which when tension is applied and released will cause a discrete vibration. After the release, the bridge and internal sound post connected to the two soundboards project the energy of the string movement, projecting the energy into the room. This causes sound to propagate through air due to the f-holes on the cello acting like a Helmholtz resonating chamber, boosting the bass notes and undertones. In this project, I wish to take the notes of the cello and analyze the notes of the cello to look at the discrete frequencies by using a discrete Fourier transform (DFT). Working with my instructor to understand and interpret the DFTs, and as well as to see how the frequencies change depending on various states of the cello, such as endpin length, if the f-holes are covered, and if such frequencies can be replicated without using the cello architecture while providing the same string length. The goal is to have a better understanding of DFT's and their applications and as well as to how to create a design of experiments by changing variables to produce correlations of what significantly changes audible frequencies in the cello

Deliverables

The course instructor will assist me in my design process of the experiment and assist me in analysis of how to interpret the data I collect. The completed product will be a short presentation that I will share with the class

Golisano College of Computing and Information Sciences

CSCI-250 Concepts of Computer Systems

Project Title

Exploration of the Programming Process using MIPS Assembly Language

Course Description

An introduction to the hardware and software organization of computer systems. The course emphasizes a multilevel model of computer organization. Topics include the digital logic level; the microarchitecture level; the machine instruction set level; the operating system level; and the assembly language level. Programming assignments will be required.

Overview

In this Honors Option, I will extend the standard course in Concepts of Computer Systems by going through the problem-solving process at the assembly language level for a problem of my choosing. By going through this process, I will learn firsthand the benefits and disadvantages of working directly at the assembler and machine instruction set level. In addition, it will become clear how modern-day programming languages evolved and will explain why further abstraction has been necessary to solve various types of programming problems. In the end, I hope to gain a new appreciation and understanding for what goes on behind the scenes and under the hood of today's most popular programming languages.

Deliverables

With the guidance of the course instructor, I will create a unique project assignment designed for the course. The deliverables for this include a write up of the project with specific program requirements and features, a solution to the project written in both a higher-level language and MIPS assembly, and automated unit tests which can be used to evaluate the correctness of a project solution. Once completed, a presentation with the course instructor and other interested parties will be held to show the final product.

SWEN-344 Web Engineering

Project Title

Job Application Tracking

Course Description

This course in web engineering emphasizes organizational aspects of web development, design, and implementation by individuals and small teams. Students will apply software engineering principles to web applications correctly. Course topics will include, but not be limited to, web usability, accessibility, testing, web services, databases, requirements elicitation, and negotiation. A term-long, team-based project done in a studio format reinforces concepts presented in class.

Overview

Web applications are ubiquitous today, with many focusing on areas in e-commerce, social networking, and finance. Since web apps exist in many different forms and technologies, creating and releasing an application to the public has become simpler. While building web applications has gotten simpler, keeping track of job applications has gotten more complicated. In this Honors option, I will create a full-stack web application for job application tracking to address the growing complexities of applying to careers in a competitive industry. I will allow potential users to keep track of their applications' status as they progress toward the eventual offer. With the course professor's help, I will utilize the "MERN" tech stack comprised of MongoDB, Express.js, React, and Node.js, working with alternative database designs and web frameworks from the course standard.

Deliverables

My course instructor will first review my initial database schema, and I will then go on to develop the subsequent APIs and frontend interface; at each stage of the project, I will document my requirements and provide them to my instructor. The implementation of database will be completed by <date redacted>, the creation of REST APIs will be completed by <date redacted>, and the developed frontend will be finished by <date redacted>. By the penultimate week of the semester, I will have the application's final, fully tweaked version. After a last review, I will present my web app to the class, discussing the differences between the tech stacks used in my Honors option and the course material.

IGME-309 Development for Real-Time Simulations and Games II

Project Title

Research of Computer Graphics in Video Games

Course Description

This course continues the investigation into the application of data structures, algorithms, and fundamental Newtonian mechanics required for the development of video game applications, simulations, and entertainment software titles. Topics covered include quaternion representation of orientation and displacement, cubic curves and surfaces, classifiers, recursive generation of geometric structures, texture mapping, and the implementation of algorithms within game physics engines for collision detection and collision resolution of rigid bodies, and the numerical integration of the equations of motion. In addition, advanced data structures such as B+ trees and graphs will be investigated from the context of game application and entertainment software development. Programming assignments are a requirement for this course.

Overview

In this Honors Option project, I will delve into the realm of computer graphics and its pivotal role in the world of video games. Specifically, I will concentrate on the software implementation using OpenGL, a state-of-the-art graphics library, to create software prototypes and/or functional components that will facilitate the analysis of GPU's rendering capability and its scalability in data sizes. This project will not only enhance my knowledge of graphics programming but also provide valuable experiences in applying this knowledge to research, thus broadening my understanding about the field of game technology. Working closely with my course instructor, I will start by acquiring a solid foundation in game data structure and algorithms and trying their practical implementations using graphics libraries as part of the course curriculum. Following this, I will collaborate with the instructor's research team to conduct some

literature review about existing approaches, define the scope and objectives of the honor project, and develop software prototypes and/or functional components for the project.

Deliverables

The primary outcome of this honors option is to acquire knowledge beyond the scope of regular course lectures and to cultivate research experience through active participation in a graphics research team. The prototypes and components that I will develop may streamline the research analysis process, providing visualization, data collection, and analysis features. More specific tasks will be discussed with the instructor in the later of the semester. A written report will be submitted to the instructor by the end of the semester.

Kate Gleason College of Engineering

BIME-370 Introduction to Biomaterials Science

Project Title

Exploring the Use of Magnetic Nanofibers for Improving 3D Bioprinting of Hydrogels

Course Description

3D bioprinting of hydrogels is a promising technique for fabricating cell-seeded constructs that resemble human organs or tissues. This technology finds applications in tissue engineering and drug testing as it provides a three-dimensional environment that offers a higher physiological relevance than traditional 2D culture. However, when aiming to simulate diseased tissues and organs, a variety of characteristics such as stiffness of printed constructs, will determine whether cell responses are similar to the in vivo situation.

Overview

Reinforcement of hydrogels with nanofibers, for example, obtained through the process of electrospinning, can help to achieve enhanced printing accuracy and more closely simulate the mechanical properties of the target tissue. Furthermore, the organization of the extracellular matrix is known to affect cell behavior. In numerous pathologies, the degree of collagen fiber alignment changes with disease progression. By using magnetic nanofibers, for example, through incorporation of magnetic nanoparticles, it may be possible to simulate these crucial changes in collagen orientation in vitro. The proposed honors project will involve a literature review on the current state of 3D bioprinting, the creation of magnetic nanofibers, and the alignment of these fibers as reinforcement for the biological construct. The literature review will help to identify gaps in the current research and provide an understanding of the background of 3D bioprinting, electrospinning and the use of magnetic nanofibers. Furthermore, the literature review will help inform the design of an R01 grant application and provide an overview of the state of the art in this area. It will provide me with an opportunity to understand the process of taking a research idea to project design and funding acquisition and how to conduct experiments to acquire preliminary data that supports the grant application.

Deliverables

I will compile the findings of my literature search on the use of magnetic nanofibers for improving 3D bioprinting of hydrogels into a report. The course instructor will advise my literature review. At the end of the project, I will present my findings to the professors participating in this future research project.

CHME-330 Mass Transfer Operations

Project Title

Application of Common Process Separation Units for Drinking Water

Course Description

This course covers the analysis and design of chemical processes for the separation and purification of mixtures. The course includes an introduction to the fundamentals of diffusion leading up to mass transfer coefficients and their use in solving a variety of engineering problems. Design methodologies are examined for equilibrium-based processes (such as absorption, stripping, and distillation). Rate-

based separation processes, including packed columns and batch adsorption, are examined, and contrasted with equilibrium-based processes.

Overview

All living things on Earth need water to survive. Without water no life would exist. As industrialization took over the world, engineers devised ways to take water from several different sources and make it safe for humans to drink. Any visit to the grocery store and looking at the several types of bottled water (distilled, purified, etc.) makes it clear that there are many processes used to make clean drinking water. All these processes are used in many different industries including the chemical industry. In this honors option, I will use the course study of different chemical separations units and their application to different types of drinking water. Using the fundamentals of mass transfer operations, I will learn to calculate and size these different pieces of process equipment. This research project will facilitate my understanding in the application of math and physics to process separation as well as the history and other uses for these units.

Deliverables

The course instructor will determine that I have met the requirements for this Honors option in a satisfactory display of quality research and analysis, and correct application of the equations used in class after giving a presentation to faculty members of the Chemical Engineering department. After completing each additional separation unit study, the course instructor will approve my work.

MECE-406 Advanced Computer Aided Design

Project Title

Adaptive Tech Design and Production Using Creo Parametric

Course Description

This course covers advanced solid modeling concepts utilizing industry standard parametric 3D modeling software. Part modeling concepts include parametric design, surface modeling and 3D annotation. Assembly modeling concepts include top-down assembly, mechanisms and assemblies. GD&T concepts are covered.

Overview

For an honors option for MECE 406 (described above) I propose that I complete an alternate project investigating the usage of Creo Parametric for modeling adaptive technology innovations and ideas, specifically wheelchair modifications. The goals of the course include design and modeling of both individual parts and assemblies, however, the projects in the course material are standalone projects that exist in a vacuum without the nuances of a client, or the challenges posed by the eventual machining or printing of the creations. With this project, I propose that I will collect a variety of ideas for adaptations or modifications to be added to wheelchairs from the various wheelchair users on campus or from contacts I have in the wider disabled community. With Professor Leipold's instruction and guidance I will then design and produce the various items utilizing Creo Parametric and the various makerspaces on RIT's campus. This option will not only enhance my understanding and depth of learning in Creo Parametric but will also allow me to interface with pseudo clients and confront the realities of the production process.

Deliverables

I will create at least 3 products (potentially as many as 5) and will meet with the professor once a week and with various subject matter experts as needed. I will present an overview of my work at the Honors Research and Creativity Symposium, including the products that I create.

Saunders College of Business

ACCT-210 Management Accounting

Project Title

Analysis of Cost Structures between High Fashion and Fast Fashion

Course Description

Introduction to the use of accounting information by managers within a business. Explores the value of accounting information for the planning and controlling of operations, assessing the cost of a product/service, evaluating the performance of managers, and strategic decision making.

Overview

Fast fashion is often defined as trending clothing styles that are sold at very low costs when compared to anything you might find in a mall. High Fashion can be defined as the most luxurious and very exclusive clothing often worn strictly by models or celebrities. With the obvious price differences between the two industries, we are often left wondering, are we paying for the quality of the materials and production, or just the brand? In this honors option I will use the cost structures outlined in Managerial Accounting to analyze the differences between fast fashion and the high fashion industry. In my research I will look at and analyze the financial statements and their accompanying information from two publicly traded companies within each industry. I will use these to analyze the differences these industries have with internal costs such as direct and indirect materials, labor, and factory overhead. In addition, I will analyze how these costs compare to consumer pricing with the goal to identify if there is a difference between the quality and reason for the price differences between the two industries.

Deliverables

The course instructor will supervise my research and review my final research paper on the cost structures of the two different fashion industries. I will then put together a presentation with a summary of my findings and conclusions and will present in class.

MGMT-330 Design Thinking and Concept Development

Project Title

Analysis of Design Thinking and Concept Development in the Medical Device Industry

Course Description

Design thinking is a process that aids collaboration among designers, technologists, and business professionals. The process provides a structured creative process for discovering and developing products, services, and systems for profit and non-profit applications. Students will apply a wide range of design tools in a hands-on project. Topics include problem-framing, end-user research, visualization, methods for creative idea generation, and prototyping.

Overview

In this honors option, I will apply the concepts and processes of design thinking to analyze whether medical devices companies in industry use the framework of design thinking. Specifically, I will analyze how empathy is developed for end users; how market impact, value creation, efficiency, and customer responsiveness is applied; and how rapid prototyping of ideas and solutions effectively addresses a customer need. With the help of the course instructor, I will select a medical device company to analyze. I will analyze literature and documentation related to the design process of the company. I will also interview some engineers in industry to better understand the design process from the beginning to the end. This project will enrich my understanding of how design thinking is used (if at all) in the medical device industry. This will not only expand my knowledge regarding the medical device industry but help lead me to a company who uses design thinking as I pursue a career in biomedical engineering at a medical device company.

Deliverables

The course instructor will supervise my analysis of design thinking and concept development in the medical device industry. After writing the analysis report, I will present my research to the college honors cohort at the end of the semester.

MGMT-340 Business Ethics and Corporate Social Responsibility

Project Title

Business Ethics in Biotechnology

Course Description

This course applies concepts of ethics to business at the macro level and at the micro level. At the macro level the course examines competing business ideologies exploring the ethical concerns of capitalism as well as the role of business in society. At the micro level the course examines the role of the manager in establishing an ethical climate with an emphasis on the development of ethical leadership in business organizations. The following topics are typically discussed: the stakeholder theory of the firm, corporate governance, marketing and advertising ethics, the rights and responsibilities of employees, product safety, ethical reasoning, business's responsibility to the environment, moving from a culture of compliance to a culture of integrity, and ethical leadership.

Overview

In this Honors option, I will extend the standard course in business ethics by researching the ethical problems that are ever present in the biotechnology industry. I will first use the course readings and lessons to gain an understanding of ethics and reflect on every day and situational ethical questions. Videos will develop subjects such as the social contract, consequentialism, altruism, collectivism, and many other aspects of ethics. These aspects can then be applied to the biotechnology industry, which will be researched through reading academic articles, studies, cases, and videos while working with the course instructor. The investigation into the industry will highlight issues on product safety, environmental impacts, and social consequences given the relatively new technology in practices such as human trials, genetically modified organisms, and medicine. The goal of the project is to delve into biotechnology innovations and the ethical questions that they bring about. As a biotechnology major myself, this will enable me to better understand the industry I am hoping to work in and allow me to reflect on my own ethical standards and how I want to steer them in the future.

Deliverables

The course instructor will oversee and advise on ethical concepts I may have questions about. I will use what I learn from the course material and instructor, as well as outside research about ethics and the biotechnology industry, to write a report on how business ethics play out in this field. I will also deliver an oral presentation either at Imagine RIT or in class.