What is the Interactive Media Design (IMD) degree and how does it differ from other computer-related degrees offered at UW Bothell?

The Interactive Media Design degree is focused on the production, design, development, and the implementation of various forms of technology and media as they are combined to solve real world problems. It also has a core qualitative and quantitative assessment component.

Unlike the Computing and Software Systems (CSS) degrees, it is not heavily programming-oriented, but has more emphasis on design skills and the building and creating of new ways to interact with technology. We will certainly design and build interactive computer games, but we will also look at other ways that people interact with the world as well.

For instance, looking at performance and technology, we might examine dance and how we can record dance movements to then be integrated into a video... that can also be part of a game... that may be incorporated into an interactive kiosk at a theater... that provides real-time data that influences the actual dance movements. It is truly the blending of different technologies and media together to create new and creative applications and interactions with our world.

Media is very complex. You have to know a lot about everything in order to be successful as a producer or an assistant producer, whether you are approaching a problem from the marketing side or as an artist or a programmer. You have to know what the rest of your team is thinking.

What does the Interactive Media Design degree offer students?

First of all, one of the unique things about this degree is that it is very studio-intensive. It has a two year studio component, with 60 credits of the junior and senior year focused on the production, design, development, and the implementation of various forms of technology and media as they are combined to solve real world problems. It also has a core qualitative and quantitative assessment component.

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Letter from the Director

Dear Friends of Computing & Software Systems,

In preparing my letter for this newsletter, I always look over old ones, at the very least to make sure that I don’t end up repeating myself. Despite my best efforts, however, I seem to always spend some space writing about the many changes occurring, plans afoot, etc., etc. I’m going to stop doing that, and just assert that, from now on, assume that these things are the norm in CSS, perhaps more so than most places due to our entrepreneurial spirit and flexible organization.

As you read through this newsletter, you’ll find a sampling of CSS activities over the last half year. We’ve changed the names of our BS and MS degrees. We have some retirements (Chuck Jackels and Dina Fix) and some new arrivals (Wooyoung Kim, Tina Wong, Macneil Shonle, and Julie Ryan). We’ve had a couple new batches of wonderful graduates doing fascinating and challenging cooperative education projects. We graduated our first 18 masters students. We collaborated with the IAS program in the creation of a new bachelors degree in Interactive Media Design. Our faculty publications increase in volume and impact while they secure increasing numbers of external grants for their research — work that invariably includes UW Bothell undergraduate and graduate students (as you can see by the co-author names on the publications).

Remember that, for UW Bothell CSS, this is all just the beginning.

Cordially,

Dr. Michael Stiber
Professor and Director

Bachelor of Science Degree Name Change Approved

We are pleased to announce that UW President Michael Young approved the BS degree’s new name: Bachelor of Science in Computer Science and Software Engineering (BSCSSE). We feel that this new name improves the clarity of communication with persons outside UW.

Master of Science in Cyber Security Engineering (MSCSE) Coming to UW Bothell in Autumn of 2013

The Computing and Software Systems Program is currently developing a new Masters degree in Cyber Security Engineering. The MSCSE curriculum will focus on preparing students for the secure engineering and development of defensible systems and networks. By incorporating a comprehensive approach to the secured development lifecycle (SDL), courses in the MSCSE will couple advanced studies in computer science techniques with the practical engineering considerations associated with cyber-security theory.

Curriculum will cover such topics as security-related engineering approaches, improvement of defense, maintenance of legacy systems, and knowledge of end-of-life issues. Students will be able to design forensics-ready architecture for defensible and resilient systems and networks. Graduate will acquire a unique skill set, enabling them to become leading practitioners in cyber-security.

RETRIING STAFF AND FACULTY

Dr. Charles Jackels

After 17 years at UW Bothell, Prof. Charles Jackels retired this summer. Chuck came to UW Bothell in 1995 from Wake Forest University, where he was a Professor of Chemistry.

Starting as a Senior Lecturer in the Computing and Software Systems (CSS) and Interdisciplinary programs Arts and Sciences (IAS), he became Professor and Director of CSS in 2000, remaining in that role until 2008. Subsequently, Chuck was Vice Chair, and later Chair, of the UW Bothell General Faculty Organization and then Director of the UW Bothell Science and Technology Program.

Chuck was a wise, steady hand for the CSS Program during a time of great turmoil within the technology industry and computer science higher education. He is the reason that CSS not only weathered the storm, but came out of it stronger than ever.

Dina Fix

Our undergraduate advisor, Dina Fix, retired this summer. Dina brought great experience in engineering education support to a young, rapidly growing CSS program, helping to guide development of student services and shepherd hundreds of CSS undergraduates to their degrees.

Her guidance and advice to CSS staff, faculty, and administration has helped us build the effective, robust, and dynamic curricula we have today. Beyond all this, Dina never lost sight of the fact that students’ welfare is our first priority.
Supporting Research with Data Provenance

This past July, Delmar Davis spent almost two weeks interacting with computer scientists, physicists, and data analysts at Lawrence Livermore National Laboratory (LLNL). He was evaluating Experiment Explorer, a metadata search tool that was designed to aid researchers determine the provenance of experiment files. Data provenance, which identifies the origin of the data or the processing steps applied to data, is necessary for the repeatability of analyses or experiments.

In collaboration with Dr. Ghaleb Abdulla at LLNL and under the supervision of Hazel Asuncion, his work on Experiment Explorer began as a project for CSS 497, a 10-credit capstone course. Because of his exceptional performance, his work was later published at the USENIX Workshop on the Theory and Practice of Provenance (TaPP). Last June, he presented Experiment Explorer at TaPP in Boston being the only undergraduate student presenter at the workshop.

Moreover, his evaluation of Experiment Explorer at LLNL yielded positive results: researchers look forward to integrating EE into their research activities and Del learned much about the research process. According to Dr. Abdulla, “I was impressed with Del’s ability to quickly learn the necessary tools and to deliver the EE prototype in a short period of time. This created an opportunity for him to publish and to evaluate Experiment Explorer at LLNL. While at the lab, he worked diligently on setting up appointments with the scientists and he meticulously recorded their comments and suggestions.” Del plans to pursue a Master’s Degree in Computer Science at UW Bothell. We talked to Del about his project.

Tell me about your project and what problem it helps address?

The Experiment Explorer project helps researchers quickly find experiment artifacts and determine the provenance of a data set. Experiment artifacts include experiment design documents, workflows, raw results, extracted result features, and output analysis. Many files are produced for each experiment run. After an experiment, many more files are produced during analysis. Over the course of even a few experiments, the quantity of files produced makes it difficult to find an experiment artifact or to determine which artifacts are related to other artifacts. Moreover, these files are located on different storage systems that are networked. In order to search for them, a common view of the file systems must be provided. Once the issues of scale and access are handled, consideration must be given to the file formats. Much of the data (especially images) are semantically meaningless unless some description is provided.

What is data provenance and metadata?

In Experiment Explorer a description is provided for all experiment-related artifacts. Each description constitutes metadata for a given file or data set. Metadata is data about data. In the case of Experiment Explorer, it is used to update an Apache Lucene index that is queried through Apache Solr. The most interesting searchable fields include those that describe information connected to an artifact throughout its existence. This information is known as data provenance. Data provenance answers question like, “When was this made?”, “When was it saved?”, “Who made it?”, “When was it referenced?”, “How was it used in this subsequent reference?” Metadata fields in a newly indexed document describe the

WELCOME OUR NEW STAFF AND FACULTY

Dr. Wooyoung Kim
Wooyoung Kim is joining us this fall as an Acting Assistant Professor.
Wooyoung comes to us from Georgia State University, where she did her Ph.D. work in bioinformatics algorithm development.

Prof. Macneil Shonle
Macneil Shonle is joining us as a Research Assistant Professor.
Macneil received his Ph.D. in Computer Science at UC San Diego and was an Assistant Professor at the University of Texas at San Antonio before leaving there for Basho Technologies.
He is currently collaborating with Hazel Asuncion on a recently approved NSF-funded project, “Tracing and Reasoning about Changing Artifacts.” This project aims to develop a lightweight, flexible, and systematic approach to manage change during software development.

Tina Wong
Tina Wong is joining us as the new undergraduate advisor for the CSS program.
Tina comes to us from UW Seattle’s International Programs and Exchanges (IPE), where she was a student counselor overseeing all such services for international students and working with a wide range of academic departments on their exchange programs.

Prof. Julie Ryan
We welcome Julie Ryan as a Visiting Associate Professor. Julie is an Associate Professor at George Washington University, where she is Chair of Engineering Management and Systems Engineering.
Julie is working with us on development of a new MS degree in Cybersecurity Engineering.
DAVID SCHMIEDER  
**Numera Health**  
**Android Based Telehealth**  
David worked on a home telehealth hub that will provide an easier interface to users to send their medical data to their health care provider. The ‘Home Hub’ has the ability to upload medical data from pedometers, glucose meters, weight scales, pulse oximeters, PT/INR meters, blood pressure cuffs, and peak flow meters. He worked in many areas including: raw USB communication, modifying and building Android, working with JNI, and implementing the UI.

JUSTICE DEVARA  
**Optimization of Motion Detection in Aerial Image Registration**  
For his faculty research project, Justice explored Computer Vision techniques in image registration and position estimation using two sequences of aerial images. He utilized C++ programming in setting up and solving problems in linear algebra related to 3-D rotations and transformations, as well as using publicly available Levenburg-Marquardt optimization routines.

JOHN STOCKWELL  
**Sentiment Analysis and correlation of Twitter Messages**  
John built a tool that downloads streams of Twitter messages based upon user input keywords. Using a custom algorithm, the software determines the sentiment towards the keyword and then looks for correlations between sentiment and other Twitter data, such as: location of user, date of post, other users followed, activity level, number of followers, etc. The software then outputs data for further analysis and info graphic creation.

HANNAH VAN EENOO  
**The Boeing Company**  
**Automating and Tracking the Internal Application Development Process**  
Hannah developed a piece of software that automates and tracks the internal application development (IAD) process for the Kent (WA) Boeing site, freeing employees from relying on an older system that consisted of Excel Spreadsheets and manual email reminders. She worked with Microsoft Access forms, databases, VBA code, linked tables, SharePoint sites, and SharePoint Designer Workflows.
FARAZ ROMANI
UIEvolution
RESTful Ruby on Rails Web Tool
Faraz helped simplify the process of maintaining data for an iPad menu application UIEvolution was developing for restaurants. The iPad menu application will replace paper menus and provide restaurant patrons with more information about dishes and drinks, such as nutrition and allergens. Faraz developed a back-end data management website to help restaurant managers update and maintain the menu data for the application. He built the website using Ruby on Rails and utilized jQuery, Ajax, and MySQL.

SAHAR MAASSOUD FAR
Judy's Book
Software Development for New Website Service Kidscore.com
Sahar worked with Judy’s Book, a Social Search tool, as a developer to help with the expanding and launching their second website called Kidscore.com. Sahar’s primary project was a major integration effort with the partner sites, including judysbook.com and kidscore.com, with some time spent on a variety of other smaller tasks such as: debugging, testing website contents and mobile functionality, and maintaining data interfaces among systems.

ALEX COTIGA
Procedural Terrain Generation in 3D
Alex studied and implemented algorithms and data structures, leading to the development of his own terrain generation engine. Inspired by independent games, such as Minecraft and Cube World, he chose to generate terrain out of millions of colored cubes. Due to his decision, there were quite a few complex challenges to overcome along the way before he reached his end result.

EVAN HARRIS
Vertafore Inc.
Interactive Reporting Platform
Evan worked as a software engineer on a reporting platform for his internship with Vertafore. The platform is meant to give power to insurance agents so they can create their own reports without the need for custom SQL. He took on many smaller pieces of the overall software system while gaining a better understanding of C# and the Vertafore program architecture.
inform the next iterations and even create a new design as the design itself is being implemented.”

We’re going to really push the theory in addition to the practice components; it’s not going to be a practice-only degree. It is going to have a very heavy emphasis on the academic theory and the understanding of what and why design works – or doesn’t.

What are some examples of courses that a student pursuing the Interactive Media Design degree would be taking? What types of projects could a student expect?

We have four courses that are prerequisites to the program, two of which will likely be offered by the Interdisciplinary Arts and Sciences (IAS) program and two that will be offered by the CSS program. For instance, the Introduction to Interactive Media course and the Writing Narrative for Digital Media course will be offered through IAS. Then through CSS (these are being developed within the next year), Quantitative Methods in Interactive Media and then a more advanced Media Technologies course. These prerequisite courses will be open to all students.

Once you get into the major, then we have some advanced courses that get into digital media, architecture, and systems. For example, we have a course on advanced media production techniques that includes the process of designing, building, and implementing these things. Students will learn how to work with a wide variety of people, approaches, and job skills.

Another interesting thing about the program is that students are required to define a specialty area. With the help of an IMD faculty member, students will determine which specialty they are interested in, such as 2-D or 3-D graphics, and then take a set of prescribed courses that help develop their skills in that particular area. We want to allow students to pick a specialty area and then develop and design a project that focuses on that. We have a very long list of 20-30 different specialty areas that we have already identified, plus the student can also define a custom specialty area.

We’re working with industry right now to identify real-world projects that we will bring into the classroom. We are meeting with large companies like Microsoft and Boeing in addition to a lot of small startup companies. We’ve been looking in the healthcare area, everything from helping adults deal with wellness issues to even geriatric health issues. The list of projects is huge, and it is only growing.

What types of jobs do you see graduates taking on?

A job as a game designer, for instance. Since this is an undergraduate degree you might not just jump right in and be a producer, but you might be an assistant producer, art director, or a project manager lead. Since some students will actually decide to have more of a focus on technology and computer programming, say they take some of the CSS courses, they could certainly work as a programmer, working with a variety of scripting languages or delve deeper to some lower-level coding if they want to.

We’re probably situated in one of the top “game-oriented” areas in the world, right here in the Bothell corridor. The IMD degree is designed to leverage our location and provide that direct connection to those industries and hopefully, students will be able to graduate with an already-established relationship with a company (or two) so they can get a job as soon as they are done.

I think the job opportunities are as creative as the program is, and as the students are, and this industry is ready for our graduates now.

Is there a high demand for these jobs?

Yes, absolutely. Given the region where we are at, and I think it is pretty clear from all the job and labor demand statistics. Some would say “Oh, but it is really hard to get a job in this field.” Yes it is, but that is if you don’t have the right skill sets, and quite frankly most people that want to get into the field also need to have a portfolio of meaningful projects to get in the door.

This degree is really trying to get that portfolio requirement accomplished. Not to mention establishing connections with industry. It’s a small world, especially in media. Having those connections is very critical. It is very similar in the sense with what we do with the internship program in CSS. I’d say 70% of our students in CSS get jobs because they end up working for (or at least have an offer from) the company they did their internship with.

I get calls from companies big and small all the time asking for “Hey do you have someone who can do X Y or Z? Have them bring their portfolio.” That is a big problem for a lot of people – and the IMD degree will address this.

The Interactive Media Design degree is the first degree at UW Bothell to have a faculty advisory board. What exactly is the Academic Oversight Committee and how will it benefit the students pursuing the degree?

The Academic Oversight Committee is a joint faculty committee because this degree is not housed within a specific school or college. It is an interdisciplinary degree, not a program. We have faculty from IAS, faculty from CSS, and then a faculty lead as the director for the degree program (myself).

As a committee, we look at the overview of the curriculum to ensure academic standards and quality is maintained. We’ll be looking at the building and designing of all the details of all the courses. We’re also going to develop all the advising processes and procedures. For example, we will help design and approve a different specialty area for a student to ensure it is relevant for the degree and relevant for the student so he or she can succeed.

We will provide reports and liaison with the faculty of the programs that are being represented. Additionally, we’ll be responsible for new faculty hires. Already we’re bringing on two new faculty members for IMD this year.
selected Publications

A Broader Threshold: Including Skills as well as Concepts in Computing Education

A Holistic Approach to Software Traceability

Biological Network Motif Detection and Evaluation
Wooyoung Kim, Min Li, Jianxin Wang, and Yi Pan. BMC Systems Biology, V.5 2011.

Bursting Behavior in a Large-Scale Model of Cortical Network Development

Capturing Custom Links across Heterogeneous Artifacts

Computing in Asia: A Sampling of Recent Success Stories

Experiment Explorer: Lightweight Provenance Search over Metadata

Game-Themed Programming Assignment Modules: A Pathway for Gradual Integration of Gaming Context into Existing Introductory Programming Courses

Mobile Applications and Museum Visitation

Safety of Measuring Instruments and the Probative Value of Digital Data

Tracing Data Sources within Spreadsheets
Hazel Asuncion. In 4th International Provenance and Annotation Workshop (IPAW), June 2012.

Grants

Tracing and Reasoning about Changing Artifacts
National Science Foundation, $490,580. Hazel Asuncion and Macneil Shonle (co-PI).

Game Themed CS1/2: Empowering the Faculty
National Science Foundation, $250,000. Kelvin Sung (PI).

5th Annual Pacific Rim Collegiate Cyber Defense Competition

Sea to Shining Sea

University of Washington Scholarship for Service

‘PROVENANCE’ CONT.

Provenance of the artifact in addition to forming a link between it and the experiment.

What got you interested in this project?
Dr. Hazel Asuncion’s enthusiasm for research in provenance and traceability was a key factor in my decision to develop this software. She presented me with several opportunities to work with research organizations. The decision to work with LLNL wasn’t difficult to make. After all, increasing efficiency at a nationally funded organization not only puts our taxes to better use, but in this case it may make a small impact toward solving global energy issues.

What were some of the hurdles you had to overcome in this project?
A requirement for this project was to use open source technologies for development. Learning an open source tool can be quite difficult. Documentation is sparse and often assumes familiarity with the problems that these tools help solve. Additionally, designing a tool to deal with a highly secure file system at a remote location posed some difficulties. On the other hand, not knowing exactly what I was dealing with helped keep the tool abstract and facilitated timely adaptation to the researcher’s needs.

What is the next step?
Based on feedback from the researchers at LLNL, I will continue to refine Experiment Explorer and to add new components proposed in the TaPP paper. We will also be submitting the results of our evaluation to a conference. If there is an opportunity, I would like to intern at the lab to implement the full Experiment Explorer system.

When can this product be available to companies, institutions, and/or organizations?
LLNL has an initial prototype capable of indexing and querying for the main experiment samples. Applying this solution to other large research facilities would require their experiment process to match Lawrence Livermore’s. In particular, a provenance template would have to be created for every experiment run, at the given facility, in order to derive metadata for the experiment artifacts.
Help Support Our Mission!

Whether it’s $5 or $500, every gift helps keep the Computing & Software Systems program a unique and rewarding experience for our students and an important resource for computing education in this region.

Support from our alumni and friends enables us to grow our activities even in these tough economic times.

Become part of our mission by donating today. Direct your giving to CSS by visiting www.uwb.edu/css and clicking on the ‘Make a Gift’ link.

*Thank You for Your Generous Support!*