

**Washington College Chemistry Teachers Association
2016 Conference Program at a Glance**

Thursday, October 13, 2016	
3:00 – 10:00 pm	Check-in
4:30 – 10:00 pm	Conference Registration (Woodpecker)
6:00 – 7:30 pm	Dinner (Kingfisher Dining Lodge)
8:00 – 10:00 pm	Informal socializing (Grotto Bar, hot tub, library, etc.) Possible Talk and Evening Program to be announced!!! <i>No-Host Bar</i>

Friday, October 14, 2016			
7:30 – 8:30 am	Breakfast		
8:45 – 9:00 am	Welcome – Chapel Theatre		
9:00 – 10:15 am	Keynote Address Subha R. Das , Associate Professor, Carnegie Mellon University " The Kitchen Chemistry Sessions: Molecular Cuisine to Make Science Palatable "		
10:15 – 11:00 am	Vendor Break , Salmon Gallery		
	Chapel Theatre	Woodpecker (food)	Flicker
11:00 – 11:30 pm	Fluorescence of Common Foods (Trisha Russell, Whitworth University)	Science Writing and the Organic Laboratory (Karen Goodwin, Centralia College)	Use of a card sort task to define a progression for coordinating three levels of representation in chemistry (Emily Borda, Western Washington University)
11:30-12:00pm	Food: How to Hook GOB Students' Interest in Chemistry (Janice Koles Gard, Whitworth University)	Organic chemistry roundtable (facilitated by Brett Goldston, Bellevue College)	The Challenges and Successes of Planning and Executing an Interdisciplinary Course: "From the Fire! The Art and Science of Ceramics" (Dharshi Bopegedera, The Evergreen State College)

12:00 – 1:00 pm	Lunch		
Friday, October 14, 2016			
	Chapel Theater	Woodpecker	Flicker
1:00 – 1:30 pm	Beer, Chemistry, and the Undergraduate Laboratory (Aaron R. Moehlig, Highline College)	Using OneNote in the Classroom (Jeffrey Engle, Tacoma Community College)	Prep Chem Roundtable: Outcomes for General Chemistry (Darsi Fouillade and David Reichgott, Cascadia College)
1:30 – 2:00 pm	Building Strong S.T.E.M. Foundations In and Out of the Lab Through Industry Partnerships (Toby Astill, Perkin Elmer)	General Chemistry roundtable (facilitated by Sonya Doucette, Bellevue College)	You can lead scientists to the classroom, but can you make them teach - Strengthening a Community of Science Educators in Undergraduate Education (Lindsay Groce, Big Bend Community College and Tim Sorey, Central Washington University)
2:00 – 2:45 pm	Vendor Break, Salmon Gallery – Juggling?		
3:00 – 3:30 pm	Building Community in the Chemistry Classroom (Natalie Bjorge, Highline College)	Food Chemistry Workshop: Molecular Cuisine to Make Science Palatable (Subha R. Das, Carnegie Mellon University)	Green Chemistry Rapid Fire Session (Karen Goodwin Centralia College)

3:30 – 4:00 pm	Inside a Student-Centered Classroom – Building a Community of Learners (Tony St John, Skagit Valley College)		
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Friday, October 14, 2016			
4:00 – 5:15 pm	Choose your own adventure! <i>It's 5 Artisan Distillery (Cashmere) – carpool or driving</i> OR <i>Water Quality at Leavenworth Fisheries Complex (Leavenworth) – walking distance</i> OR <i>Your own time</i>		
5:30 – 6:30 pm	Reception - Salmon Gallery <i>Sponsored Beverages or no-host bar (TBD)</i>		
6:30 – 7:30 pm	Dinner		
8:00-9:00 pm	Evening presentation – Woodpecker Allen Rhoades , Instructor, Skagit Valley College “Skagit Valley College Craft Brewing Academy” <i>No-Host Bar</i>		

Saturday, October 15, 2016

7:30 – 8:30 am				Breakfast		
	Chapel Theater	Woodpecker	Flicker			
8:30 - 9:00 am	Caramel Chemistry: exploring phase transitions and polymerization (Arwyn Smalley, Saint Martin's University)	Using Google Forms for Lab Data Analysis and Grading - An Interactive Workshop (Mary Whitfield and Heather Walsh Edmonds Community College)	Workshop: Implementing InterDisciplinary Investigations (IDIs) in General Chemistry (Kalyn Owens, Ann Murkowski, Heather Price, North Seattle College and Anne Johansen, Central Washington University)			
9:00 – 9:30 am	Spice-troscopy: A tongue-searing experimental approach to undergraduate instrumental analysis (Rick Glover and Grady Blacken, Bellevue College)					
9:30 - 10:00 am	The Changing Face of Chemistry 121 (Scott Morris and Jenn McFarland Skagit Valley College)					
10:00 – 10:30 am	General, Organic and Biological Chemistry roundtable (facilitated by Rick Glover, Bellevue College)					
10:30 - 11:00 am	Break and Check-out by 11 am					
11:00 – 12:00 pm	Business Meeting – Woodpecker					
12:00 – 1:00 pm	Lunch					
1:00 pm	Have a safe drive home!					

Abstracts

KEYNOTE ADDRESS

The Kitchen Chemistry Sessions: Molecular Cuisine to Make Science Palatable

Subha R. Das Department of Chemistry, Carnegie Mellon University

The ability to alter and customize the texture and appearance of food and edible ingredients has long been possible through advances in food science and technology. Molecular or modernist cuisine or the popular misnomer, 'molecular gastronomy' that has burgeoned in recent years, is the adoption of ingredients, techniques and equipment typically used in scientific laboratories. These high impact foods and recipes provide a unique opportunity to use the known science of food to engage and teach basic principles and advanced topics in chemistry and biochemistry. The Kitchen Chemistry Sessions is a lecture and laboratory course taught since 2009 that uses specific contemporary 'molecular cuisine' elements to highlight how scientific principles permeate students' everyday life and to enhance students' knowledge of chemistry and the scientific method. The food context provides a motivating opportunity that directs and sustains learning, as students are motivated to learn when they see the usefulness and relevance of what they are learning. Teaching through the real-world context of cooking permits one to apply chemistry and biochemistry to adapt and develop novel recipes and food presentations. The talk will include some demonstrations and highlights from the course.

FRIDAY NIGHT PRESENTATION

Skagit Valley College Craft Brewing Academy

Allen Rhodes, Skagit Valley College

With the industry expected to grow, demand for knowledgeable brewers has never been higher. If you've considered entering the brewing industry, or want to pursue a wider knowledge of the business itself, join the craft brewing program today!

The Skagit Valley is becoming a hub for the Craft Brewing Industry. The valley is home to nine breweries (including the college brewing lab) and two distilleries, in addition to a craft grain maltster. Local farmers are growing malting grade barley, wheat, and other brewing adjuncts. We will discuss how the Skagit Valley College is participating in the progress, growth, and future of the Skagit Valley relative to this vibrant industry. A tasting of beers brewed in the Skagit Valley with locally grown grains will finish the evening.

Karen Goodwin

Centralia College

Scientific Writing and the Organic Laboratory

The laboratory report is an integral part of the organic chemistry curriculum. However, students are generally given little to no instruction in proper scientific writing. Last year, I piloted a program to give instruction and guidance in scientific writing in my 2nd quarter organic chemistry class, culminating in a full formal lab report. The program required no changes to my normal lab curriculum, and resulted in vast improvements in the quality of writing submitted by the students. In this talk, I will explain the program, and show some example student work that indicates the effectiveness of this method.

Trisha Russell

Whitworth University

Fluorescence of Common Foods

Many common foods that we use every day fluoresce in a variety of colors. Several examples of fluorescent foods such as peppers, lettuce and bananas will be presented. These examples can be used as demonstrations in class or as laboratory experiments. In particular, banana peels have peak fluorescence of blue-white light when they are at optimum ripeness. This fluorescence can be explored in the lab using either a handheld UV lamp or a fluorimeter. Additionally, comparisons between the fluorescence of different foods such as green peppers and bananas which emit magenta and blue-white light allows for the discussion of different wavelengths of light in the classroom or laboratory.

Emily Borda

Western Washington University

Use of a card sort task to define a progression for coordinating three levels of representation in chemistry

Expertise in chemistry depends in part on the ability to coordinate three types of representations: macroscopic (observable), sub-microscopic (atoms, molecules, and ions) and symbolic (chemical equations, graphs, etc.). In this presentation, the development, initial validation, and use of a card sort task to measure this “level-coordinating ability” in individuals with varying degrees of formal chemistry training will be described. The sorting task involved a set of nine cards each bearing a first-quarter general chemistry problem. The three types of problems, stoichiometry, mass percent, and dilution, were crossed with the three levels of representation, macroscopic, sub-microscopic, and symbolic, to produce a set in which each type of problem was represented on each level. Students were asked to sort the cards according to the concept needed to solve the problem, and their sorts were analyzed according to the degree to which similar representations or underlying principle were grouped together. A novel method for generating two-dimensional sorting coordinates enabled the development of a progression for level-coordination ability. Findings suggest that, with the exception of graduate students, participant groups on average progressed from sorting by level of representation toward sorting by underlying principle, with increasing levels of formal training in chemistry. Graduate students unexpectedly sorted primarily by level of representation, and some possible explanations for this

result will be proposed. The usefulness of the card sort task paired with sorting coordinate analysis as a tool to explore the space between novice and expert behavior is discussed. Finally, potential uses for the task as a formative assessment tool at the classroom and program levels will be proposed.

Janice Koles Gard

Whitworth University

Food: How to Hook GOB Students' Interest in Chemistry

To those of us teaching Chemistry, its importance in our daily lives cannot be overstated. To the pre-nursing student, it is often seen to be a hurdle that stands between them and nursing school. Worse, many have never taken Chemistry previously, and suffer "Chemphobia."

Many of the students are traditional teenagers arriving fresh from high school. At this age, food, fun, and friends rank high in their list of priorities. In our class, food is often the tool used to hook General, Organic, and Biochemistry (GOB) students' interest in Chemistry. Demonstrations with food, group activities performed in class with their friends using bagels, and laboratory experiences using candy, break the ice with these aspiring health professionals and rapidly change their attitudes.

This talk will illustrate several lecture and laboratory examples of the use of food in our two semester GOB sequence: ether bunny "peeps", skittle dimensional analysis, and the Buccaneer (candy) mole lab help ease the students past their initial fears to mature into eager young practitioners that confidently perform organic syntheses and understand the intricacies of biological molecules in the human body.

Dharshi Bopegedera

The Evergreen State College

The Challenges and Successes of Planning and Executing an Interdisciplinary Course: "From the Fire! The Art and Science of Ceramics"

Planning and executing an interdisciplinary course that integrates art and science to provide a rich learning experience for students is challenging, even for faculty who teach in an interdisciplinary learning environment such as The Evergreen State College.

Working outside their comfort zones and becoming a student of the unfamiliar discipline while developing teaching plans and making meaningful connections between the disciplines for their students is the hallmark of interdisciplinary teaching. Although the rewards are high, so is the time commitment and effort which can result in faculty burnout. Science faculty have the added burden of working with colleagues who may not be familiar with the challenges of teaching science courses that rely heavily on laboratory work and seek to advance students' mathematical and problem solving skills.

In this presentation I will share my experience of designing and implementing an interdisciplinary course that integrated the visual arts and introductory chemistry on the theme of ceramics with the goal of attracting students to the arts and the sciences. I will discuss how this theme served to integrate the disciplines and enabled students to develop artistic skills in the ceramic studio and technical skills in the laboratory while learning the principles of chemistry and the history of ceramics. I will present the studio activities and laboratory investigations that served to explore the materials used and the oxidative/reductive firing processes.

A significant portion of the course was dedicated to engaging students in an independent group project on a range of topics related to ceramics. I will share how the faculty team guided students to develop these projects that served to raise their self-confidence. The culminating experience of presenting these projects to the public during the Annual Science Carnival of The Evergreen State College will also be discussed.

Darsi Fouillade and David Reichgott

Cascadia College

Prep Chem Roundtable: Outcomes for General Chemistry

Preparatory Chemistry (CHEM&139) at Cascadia has provided a route for consistent student success in General Chemistry. With changes in our student demographics, the need for this course has increased over the years. Please come to hear some introductory remarks about our curriculum, our focus, our successes and lessons learned, and then share your experiences. The majority of time will be allocated to a round-table discussion.

Aaron R. Moehlig

Highline College

Beer, Chemistry, and the Undergraduate Laboratory

Society has been enjoying the product of grain fermentation, what we call beer, at least as far back as ancient Egypt. In the state of Washington alone there are currently 281 (and counting) commercial breweries. It seems the process of brewing has always fascinated people, but little about the process or the chemistry of this type of fermentation has changed over the past few thousand years. Brewing beer has always involved, sometimes by law, the combination and interaction of four ingredients: water, grains, hops, and yeast. This talk will focus on the chemistry that occurs when these four ingredients are combined during the brewing process as well as how the analysis of the carbohydrates, humulones, and color of beer can be incorporated into the chemistry curriculum of a two-year institution. Samples (of ingredients) will be provided!

Jeffrey Engle

Tacoma Community College

Using OneNote in the Classroom

OneNote is a free cross-platform application by Microsoft that acts as a digital three-ring binder. It can be used to store notes, pictures, videos, audio recordings, and class handouts. In addition, these notes can be shared between students and faculty, and each notebook is automatically saved in the cloud (via OneDrive).

Over the past two years a series of classes at Tacoma Community College have used OneNote both as a note storage system and an electronic whiteboard. This allows lectures to be projected, recorded and saved while retaining the ability to give “chalk talks”. This method has proved especially

useful in organic chemistry courses which rely heavily on arrow pushing, and allows lectures to be pre-recorded for instructors who “flip” some/all of their lectures.

Furthermore, Microsoft has rolled out new features which allows integration of OneNote with course management software and electronic grade books. This talk will explore features and uses of OneNote and will also explore student feedback regarding its use.

Toby Astill

Perkin Elmer

Building Strong S.T.E.M Foundations In and Out of the Lab Through Industry Partnerships

PerkinElmer's University and College partners continually seek to inspire their students and train them to think analytically. Through industry and market insight, PerkinElmer is able to support this philosophy by providing leading-edge technical support and industrially relevant methods for data collection, data management and data analysis. FTIR UATR Spectroscopy, High Throughput Gas Chromatography, Walk Up Atomic Absorption Spectroscopy and Simultaneous and Thermal Analysis (STA) techniques are highlighted to demonstrate how the latest technologies can improve PNW colleges' positioning as academic STEM leaders. Insight will be provided into resources available to students for career development and also mechanisms available for replacing old infrastructure in laboratories and resources available from PerkinElmer's application team that allow revamping of existing experiments. When these refined teaching experiences are combined with cutting-edge analytical instrumentation, students are well-prepared for future opportunities in academia, industry or government in the PNW and around the world.

Lindsay Groce Tim Sorey

Big Bend Community College Central Washington University

You can lead scientists to the classroom, but can you make them teach - Strengthening a Community of Science Educators in Undergraduate Education

Scientists who have earned an MS or PhD are adept in their content field, but many employed by post-K-12 educational institutions have little training to survive and thrive in teaching as they begin their job. To this end, a course was designed, en-tandem with Big Bend Community College instructors, and delivered at Central Washington University in Winter Quarter of 2016 to prepare MS students in becoming effective and thoughtful teachers of science who support diverse learners through reflective teaching practices that are driven by best practice research-based science teaching methods. Course topics included the role of community colleges in public education, an introduction to collegiate science pedagogy, and practical teaching experience in authentic classroom settings. We will discuss our experiences, offer lessons learned, and suggest improvements for future offerings of this courses. We are interested in fostering better communication, mentorship, and professional development opportunities for all science educators in all areas of content and at various levels of teaching experience. A break out session with pointed dialogue will be facilitated in hopes of strengthening our post K-12 science education communities.

Karen Goodwin
Centralia College

Green Chemistry Rapid Fire Session

This session would consist of 4 or 5 - 10 minute (or less) presentations. I will contact people via the WCCTA to ask for volunteers. Each presentation will be 10 minutes including questions, and will be timed by a moderator (I will volunteer to act as moderator). At the end of the presentations, if time remains, the presenters will participate in a panel-style session to answer any additional questions or to talk more generally about green chemistry in the curriculum.

Subha R. Das
Carnegie Mellon University

Workshop: Molecular Cuisine to Make Science Palatable

The ability to alter and customize the texture and appearance of food and edible ingredients has long been possible through advances in food science and technology. Molecular cuisine or the popular misnomer, ‘molecular gastronomy’ that has burgeoned in recent years, is the adoption of ingredients, techniques and equipment typically used in scientific laboratories. These high impact foods and recipes provide a unique opportunity to use the known science of food to engage and teach basic principles and advanced topics in chemistry and biochemistry. This workshop will highlight specific contemporary ‘molecular cuisine’ elements, show how they draw on science concepts to create novel (edible) products and feature useful and practical tips for engaging students through the real-world context of food ingredients and their cooking or manipulation.

Natalie Bjorge
Highline College

Building Community in the Chemistry Classroom

Community building and cultural responsiveness in the classroom is important. Many professional development opportunities on our college campuses don’t focus on how this is possible in a science classroom. This workshop provides a space to discuss how we can better know our students to meet their needs, and provide a welcoming environment for learning. We will talk about some ideas previously implemented, as well as leave time to brainstorm these and other ideas. Community building in our classrooms is important to learning, and to building a new standard in the chemistry classroom!

Tony St John
Skagit Valley College

Inside a Student-Centered Classroom – Building a Community of Learners

Over the past two years I have been a part of an NSF grant called “Change at the Core” in partnership with Western Washington University and Whatcom Community College. Through this grant I have completely redesigned my General Chemistry curriculum to be more “student-centered.” Gone are the PowerPoint presentations and now every “lecture” period is filled with activities where the students are working together and sharing their knowledge.

My main goal in making these changes is to build a community of learners inside of my classroom. I believe the main benefit of “flipping” has been to change the culture from passive to active. While at the same time being cognizant of different personalities and making sure that every student feels safe.

In this talk I will give a brief overview of how my classroom functions on a day-to-day basis and share some of the evidence that this approach is student *friendly* and that it really works!

Kalyn Owens, Ann Murkowski, Heather Price & Anne Johansen

North Seattle College & Central Washington University

2hrWorkshop: Implementing InterDisciplinary Investigations (IDIs) in General Chemistry

For the last decade, North Seattle College has transformed introductory science courses to be interdisciplinary and to provide course-based research experiences early in the post-secondary curriculum. This work originated as a program (Atoms to Ecosystems) that combined the year-long chemistry and biology series into a single, interdisciplinary learning community. To broaden the number of students impacted by these experiences, we recently developed a two-prong approach (classroom and lab) to incorporate similar high-impact practices into traditional chemistry courses. Interdisciplinary investigations (IDIs) have now been embedded throughout our general chemistry series. The design process is centered on opportunities for students to CONNECT to prior knowledge, EXTEND out to embrace knowledge from other disciplines and scientific literature, and address a CHALLENGE involving a complex problem that requires both chemistry and biology to understand. Essential to this approach is establishing classroom routines that value and promote thinking in a collaborative learning context. In this short workshop, we will provide participants with an overview of the new curriculum, progress through one of the interdisciplinary investigations (IDIs), use a rubric to analyze student drawings as a means to more deeply engage with how an interdisciplinary learning environment promotes meaningful thinking opportunities, and engage in small group discussion about the value of this approach. The curriculum will be made available for implementation at other institutions and our team is interested in facilitating this process.

Mary Whitfield and Heather Walsh Edmonds Community College

2hr Workshop: Using Google Forms for Lab Data Analysis and Grading - An Interactive Workshop

At Edmonds Community College, we have begun using Google Forms to collect student's lab data. This allows us to immediately grade lab results for both accuracy and the correctness of the calculations. Using Excel we complete the calculations using the data the students enter, and display the results color-coded based on percent error. Students get feedback on their lab results within 24 hours of submission and have a chance to correct their calculations. Since implementing this program we have found that students are more invested in their lab results, and are more attentive to detail in their calculations. And it saves us time grading too!

We are planning an interactive workshop where participants learn how to build their own forms, as well as the Excel spreadsheet that analyzes and codes the data. Please bring your own laptop if you want to participate.

Scott Morris and Jenn McFarland

Skagit Valley College

The Changing Face of Chemistry 121

Chemistry 121 (Introduction to Chemistry) at Skagit Valley College serves a diverse audience. All of our allied health programs (dominated numerically by the pre-nursing program) take the course, as do students intending to carry on with Chem&131. In addition, it is required of students in our (4-year) Environmental Conservation Program where it serves as a prerequisite for Chem&301 Environmental Chemistry. We have also learned that many students intending to pursue transfers degrees are often advised to enroll in Chem&121 as a "remedial" class if they have not had any chemistry recently. All these various niches pose different curricular challenges in what is already a course that lacks depth and linkage. We propose to frame three general questions to the group: 1) what are the essential Big Ideas in Chem&121? 2) What traditional course content can be considered lower priority? And 3) are there essential laboratory skills the course should teach, and if so, how can they be assessed?

Arwyn Smalley

Saint Martin's University

Caramel Chemistry: exploring phase transitions and polymerization

Both introductory chemistry and non-majors chemistry classes call for a wide range of topics in the lecture and laboratory setting. Many subjects can be applied to concepts that are already familiar to the students; this enhances understanding and learning. Using food to illustrate chemistry makes the science fun, accessible, and relevant. This laboratory activity to prepare caramel candy requires careful tracking of temperature, which leads to the observation of the phase transition temperature of water, and demonstrates the concept that phase transitions occur at constant temperature. The activity also allows for qualitative exploration of polymerization and Maillard reactions through the students' observations in how the mixture changes as the reaction progresses. Through this activity students can learn some basic organic chemistry, including the organic structures of sugars and proteins, some functional groups, the basics of these chemical reactions and condensations reactions in general. I will share the recipe and laboratory experiment, suggestions for success in using them, and discuss student learning.

Grady Blacken and Rick Glover
Bellevue College

Spice-troscopy: A tongue-searing experimental approach to undergraduate instrumental analysis.

When developing our instrumental analysis labs at Bellevue College we wished to incorporate inquiry-based lab activities, particularly, with an emphasis on students designing and executing experiments. To motivate students with a lab structure that differed from the traditional “cookbook chemistry” we incorporated themes they could connect to. Two examples of these labs related to food analysis: measuring the concentration and activity of capsaicin in hot peppers and antioxidants in vegetables. These labs were designed to introduce students to the concepts of liquid chromatography and spectroscopy respectively. In the first experiment, students measured the concentration of capsaicin, which was extracted with ethanol from various blended peppers. The ethanol extracts were filtered and analyzed by reversed phase, high performance liquid chromatography with absorbance detection at 280nm. The concentration of capsaicin was determined by external standard calibration. In the second experiment, students measured the activity of horseradish peroxidase, which was extracted with cold water from different blended vegetables. The aqueous extracts were then analyzed for peroxidase activity using 3,3', 5,5'-tetramethylbenzidine (TMB) as a peroxidase substrate. The oxidation of TMB by peroxidase was monitored by an absorbance peak at 655 nm. Students performed relative quantitation of enzyme activity to compare the relative peroxidase levels in different foods. These labs also gave students a practical understanding to aspects of quantitative analysis such as developing calibration curves, interpreting data and optimizing separation and detection protocols for analysis of complex samples.